

DOCUMENT RESUME

ED 473 595

CE 084 502

TITLE Workforce Training in a Time of Technological Change. Field Hearing before the Subcommittee on Environment, Technology, and Standards, Committee on Science. House of Representatives, One Hundred Seventh Congress, Second Session (June 24, 2002).

INSTITUTION Congress of the U.S., Washington, DC. House Committee on Science.

REPORT NO House-Hrg-107-78

PUB DATE 2002-00-00

NOTE 67p.

AVAILABLE FROM U.S. Government Printing Office, Superintendent of Documents, Congressional Sales Office, Washington, DC 20402. For full text (transcript): http://commdocs.house.gov/committees/science/hsy80339.000/hsy80333_9_of.htm.

PUB TYPE Legal/Legislative/Regulatory Materials (090) -- Opinion Papers (120)

EDRS PRICE EDRS Price MF01/PC03 Plus Postage.

DESCRIPTORS * Lifelong Learning; Career Choice; Career Guidance; Career Planning; Continuing Education; Cost Effectiveness; Economic Development; Education Work Relationship; Employment Patterns; Employment Potential; Federal State Relationship; Fringe Benefits; Futures (of Society); Government Role; Hearings; High School Students; Information Technology; Interest Inventories; Job Satisfaction; *Job Training; *Labor Force Development; Labor Market; Labor Needs; Labor Turnover; Manufacturing; Needs Assessment; On the Job Training; Partnerships in Education; Policy Formation; Postsecondary Education; Productivity; Program Costs; *Public Policy; Skilled Workers; *State Programs; Statewide Planning; Strategic Planning; Technical Education; Technological Advancement; *Technological Literacy; Tenure; Two Year College Students; Undergraduate Students; Wages

IDENTIFIERS Best Practices; Congress 107th; Impact Studies; *Michigan

ABSTRACT

This report presents the testimony and submissions given at a field hearing on workforce training in Michigan. Four expert witness statements follow introductory comments from Vernon J. Ehlers and James A. Barcia, United States Congressmen from Michigan. The statement of Bruce P. Mehlman, the assistant secretary of commerce, assesses the ability of the nation to remain competitive in a global economy and the need for increased emphasis in education on technology. The statement of Cindy Ballard, the director of policy, Michigan Economic Development Corporation, reviews workforce development and training needs research in Michigan. The statement of Tim N. Clark, a researcher at Saginaw Valley State University, examines workforce challenges facing small manufacturers in Michigan. The statement of Robert C. Worthington, Sr., a Michigan manufacturer, outlines obstacles facing industries in the state and offers possible solutions from both government and business. Also included are the witnesses' biographies and financial disclosure statements, as well as a transcript of the discussion

Reproductions supplied by EDRS are the best that can be made
from the original document.

that followed the witnesses' testimony. (AJ)

Reproductions supplied by EDRS are the best that can be made
from the original document.

CE 0029

WORKFORCE TRAINING IN A TIME OF TECHNOLOGICAL CHANGE

ED 473 595

FIELD HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

COMMITTEE ON SCIENCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

JUNE 24, 2002

Serial No. 107-78

Printed for the use of the Committee on Science



U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as
received from the person or organization
originating it.

☐ Minor changes have been made to
improve reproduction quality.

• Points of view or opinions stated in this
document do not necessarily represent
official OERI position or policy.

Available via the World Wide Web: <http://www.house.gov/science>

U.S. GOVERNMENT PRINTING OFFICE

80-339PS

WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512-1800; DC area (202) 512-1800
Fax: (202) 512-2250 Mail: Stop SSOP, Washington, DC 20402-0001

2

BEST COPY AVAILABLE

CE 084 J02

COMMITTEE ON SCIENCE

HON. SHERWOOD L. BOEHLERT, New York, *Chairman*

LAMAR S. SMITH, Texas	RALPH M. HALL, Texas
CONSTANCE A. MORELLA, Maryland	BART GORDON, Tennessee
CHRISTOPHER SHAYS, Connecticut	JERRY F. COSTELLO, Illinois
CURT WELDON, Pennsylvania	JAMES A. BARCIA, Michigan
DANA ROHRBACHER, California	EDDIE BERNICE JOHNSON, Texas
JOE BARTON, Texas	LYNN C. WOOLSEY, California
KEN CALVERT, California	LYNN N. RIVERS, Michigan
NICK SMITH, Michigan	ZOE LOFGREN, California
ROSCOE G. BARTLETT, Maryland	SHEILA JACKSON LEE, Texas
VERNON J. EHLERS, Michigan	BOB ETHERIDGE, North Carolina
DAVE WELDON, Florida	NICK LAMPSON, Texas
GIL GUTKNECHT, Minnesota	JOHN B. LARSON, Connecticut
CHRIS CANNON, Utah	MARK UDALL, Colorado
GEORGE R. NETHERCUTT, JR., Washington	DAVID WU, Oregon
FRANK D. LUCAS, Oklahoma	ANTHONY D. WEINER, New York
GARY G. MILLER, California	BRIAN BAIRD, Washington
JUDY BIGGERT, Illinois	JOSEPH M. HOEFFEL, Pennsylvania
WAYNE T. GILCHREST, Maryland	JOE BACA, California
W. TODD AKIN, Missouri	JIM MATHESON, Utah
TIMOTHY V. JOHNSON, Illinois	STEVE ISRAEL, New York
MIKE PENCE, Indiana	DENNIS MOORE, Kansas
FELIX J. GRUCCI, JR., New York	MICHAEL M. HONDA, California
MELISSA A. HART, Pennsylvania	
JOHN SULLIVAN, Oklahoma	

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

VERNON J. EHLERS, Michigan, *Chairman*

CONSTANCE A. MORELLA, Maryland	JAMES A. BARCIA, Michigan
CHRISTOPHER SHAYS, Connecticut	LYNN N. RIVERS, Michigan
CURT WELDON, Pennsylvania	ZOE LOFGREN, California
NICK SMITH, Michigan	MARK UDALL, Colorado
GIL GUTKNECHT, Minnesota	ANTHONY D. WEINER, New York
CHRIS CANNON, Utah	BRIAN BAIRD, Washington
FELIX J. GRUCCI, JR., New York	JOSEPH M. HOEFFEL, Pennsylvania
MELISSA A. HART, Pennsylvania	JOE BACA, California
WAYNE T. GILCHREST, Maryland	JIM MATHESON, Utah
J. RANDY FORBES, Virginia	RALPH M. HALL, Texas
SHERWOOD L. BOEHLERT, New York	

PETER ROONEY *Subcommittee Staff Director*

MIKE QUEAR *Democratic Professional Staff Member*

ERIC WEBSTER *Professional Staff Member*

CAMERON WILSON *Professional Staff Member/Chairman's Designee*

MARTY SPITZER *Professional Staff Member*

SUSANNAH FOSTER *Professional Staff Member*

ELYSE STRATTON *Majority Staff Assistant*

MARTY RALSTON *Democratic Staff Assistant*

(II)

CONTENTS

June 24, 2002

Witness List	Page 2
Hearing Charter	3

Opening Statements

Statement by Representative Vernon J. Ehlers, Chairman, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	6
Written Statement	9
Statement by Representative James A. Barcia, Ranking Minority Member, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	9
Written Statement	12

Witnesses

The Honorable Bruce P. Mehlman, Assistant Secretary, U.S. Department of Commerce	
Oral Statement	15
Written Statement	17
Biography	24
Ms. Cindy Ballard, Director of Policy, Strategic Initiatives, Michigan Economic Development Corporation	
Oral Statement	25
Written Statement	28
Biography	36
Mr. Tim N. Clark, Director, Center for Manufacturing Improvement, Michigan Manufacturing Technology Center—Northeast, Saginaw Valley State University	
Oral Statement	37
Written Statement	38
Biography	40
Financial Disclosure	43
Mr. Robert C. Worthington, Sr., President, Globe Fire Sprinkler Corporation	
Oral Statement	44
Written Statement	45
Biography	50
Financial Disclosure	51
Discussion	
Efforts at Encouraging Women and Minorities to Study Math and Science ..	52
Worker Training Programs: An Employer's Perspective	54
The Greatest Challenges Facing Michigan's Small and Medium-Sized Manufacturers	55
Current Worker Training Programs and the Role of the Federal Government	56
Upgrading the Skills of Incumbent Workers	58
Educational Choices and Career Opportunities	60

(III)

WORKFORCE TRAINING IN A TIME OF TECHNOLOGICAL CHANGE

MONDAY, JUNE 24, 2002

**HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY,
AND STANDARDS,
COMMITTEE ON SCIENCE,
*Washington, DC.***

The Subcommittee met, pursuant to call, at 10:01 a.m. in Banquet Room A, Curtiss Hall, Saginaw Valley State University, University City, Michigan, Hon. Vernon J. Ehlers [Chairman of the Subcommittee] presiding.

**SUBCOMMITTEE ON ENVIRONMENT,
TECHNOLOGY, AND STANDARDS
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES**

Work Force Training in a Time of Technological Change

Monday, June 24, 2002

10:00 AM
Curtiss Hall - Banquet Room A
Saginaw Valley State University
University Drive
University City, Michigan 48710

Witness List

The Honorable Bruce Mehlman
Assistant Secretary
U. S. Department of Commerce

Ms. Cindy Ballard
Director of Policy
Strategic Initiatives
Michigan Economic Development Corporation

Mr. Tim N. Clark
Director
Center for Manufacturing Improvement
Michigan Manufacturing Tech. Center - N.E.
Saginaw Valley State University

Mr. Robert Worthington, Sr
President
Globe Fire Sprinkler Corporation

Section 210 of the Congressional Accountability Act of 1995 applies the rights and protections covered under the Americans with Disabilities Act of 1990 to the United States Congress. Accordingly, the Committee on Science strives to accommodate/meet the needs of those requiring special assistance. If you need special accommodation, please contact the Committee on Science in advance of the scheduled event (3 days requested) at (202) 225-6371 or FAX (202) 225-0891.

Should you need Committee materials in alternative formats, please contact the Committee as noted above.

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

COMMITTEE ON SCIENCE

U.S. HOUSE OF REPRESENTATIVES

Workforce Training in a Time of Technological Change

MONDAY, JUNE 24, 2002

10:00 A.M.—12:00 P.M.

CURTISS HALL—BANQUET A

SECOND FLOOR

SAGINAW VALLEY STATE UNIVERSITY

7400 BAY ROAD

UNIVERSITY CENTER, MICHIGAN 48710

I. Purpose and Overview

Over the last decade, a consensus has emerged that a skilled workforce lies at the heart of the Nation's economic vitality. A recent report by the Michigan Economic Development Corporation found that the State of Michigan currently suffers from a skilled worker shortage and that this situation poses a significant long-term competitive threat to the State.

To compete in today's fast-paced global marketplace, companies strive to increase the efficiency of their operations through increased utilization of technological innovations. In addition, in such fields as information technology, the technology that companies utilize changes on an eighteen-month timescale. How this technology is integrated into the work place substantially affects which skills employees need. Today's workers enter a work environment that is far different from that of their parents or grandparents. It is an environment where technology is both sophisticated and constantly evolving.

Undergraduate, associate college, or high school graduates must have up-to-date technical skills in order to enter and be successful in many different manufacturing and information technology fields. But with the speed of innovation, these skills rapidly lose their currency. Perhaps the largest challenge facing today's employee and employer is the need to continually upgrade job skills during the course of a career. The latest available estimate from the mid-1990s indicates that companies' expenditures for formal training ranged between \$42 billion and \$52 billion.

Large companies are the most likely to have formal worker training programs. Small companies, which employ the majority of the workforce, typically do not have the resources for comprehensive workforce training programs. In terms of benefits, employer-supported training can raise employee wages, improve job stability, increase productivity, and decrease turnover at firms. The difference in resources between large and small firms can put small firms at a competitive disadvantage in attracting and retaining the most talented employees or, alternatively, limit small firms' ability to upgrade their technologies with the same alacrity as large firms due to the reduced training opportunities for their employees.

Regardless of the attention focused on workforce training, much remains unknown about how to link education to career tracks and how to best structure continuing education programs for people already in the workforce—the types of training required as well as obstacles to on-going workforce training.

The Subcommittee will explore several questions:

1. What challenges do people entering the workforce and people already in the workforce face in terms of having the appropriate technical skills necessary for employment? What are the challenges for industry in maintaining employees with up-to-date technical skills?
2. What are the needs of Michigan's skilled workforce, and what programs have the State of Michigan and localities developed to address these needs?
3. What challenges do small and medium-sized manufacturing businesses face in addressing their skilled workforce needs, and what role can the Michigan

Manufacturing Technology Center play in assisting small and medium-sized manufacturers?

4. How do states develop workforce training programs, and what level of information sharing occurs among states in developing these programs? How do states identify successful model programs and best practices?

2. Background

There is consensus about the importance of a knowledgeable, flexible workforce as a key to economic performance. To compete in the fast-paced global marketplace of the post-industrial age, firms have strived to increase the efficiency of their operations by using computer technology, reconfiguration of the corporate structure, and reorganization of production processes. These changes have substantially affected the skill requirements of jobs. For example, workers in manufacturing plants today are required to operate sophisticated computerized equipment or to participate in problem-solving teams. Firms have sometimes found that they first must overcome deficiencies in these workers' basic employability (e.g., computation and communication) skills—which previously had not been in great demand—before providing them with the specific skills necessary for the implementation of workplace innovations.

Not only do entry-level workers need strong technical skills, they must also continually upgrade these skills once they begin their careers. Many employers now see that a formal degree no longer marks the end of an employee's education; rather, it begins the process of acquiring new skills necessary for continued employment. Continuing changes in the workplace environment have sped the rate at which formal education becomes obsolete. Continuing education and training are now of greater importance to adult workers who want to remain employable or to improve their earnings. Demographic changes are believed to bolster the case for lifelong learning as well; the aging of the labor force means that for growing numbers of workers the period of formal schooling has long since passed. Without a strong commitment to continuing education, more workers could be unprepared for the labor market's faster growing, higher paying jobs.

On May 1, 2002, the Michigan Economic Development Corporation (MEDC) released its study *Career Development: Building Upon Key Michigan Strengths*, which concluded that a shortage of skilled workers could present a significant long-term threat to Michigan's economic competitiveness. The MEDC presents an overview of the needs and expectations of people entering the workforce. One of the more surprising findings included in the study is that students are usually not making career decisions based on factual information such as job availability and salary levels. Rather, most decisions are based on personal interests and perceived strengths and abilities. They concluded that such an assessment could lead students to pursue unrealistic career goals versus selecting a career based on actual labor market data regarding jobs and earning power. In addition, the MEDC found that students had a bias against community colleges as a means for preparing for the job market. Michigan has implemented a number of new worker training initiatives to help upgrade workers' skills and has provided new pathways for individuals to learn about and move toward technically skilled careers. These initiatives include *Michigan Works!* Agencies, Michigan's community colleges, the Michigan Department of Career Development, and the Michigan Virtual University. Michigan now ranks as one of the best states in the country for worker training.

The Technology Administration will soon release a legislatively-mandated report assessing the job skills required in the information technology industry and existing public and private high-tech workforce training programs. This report will assess the industry's current skill needs, the educational training landscape, and continued professional development needs. Because the rapidly changing information technologies require a workforce with constantly updated skill sets, educational institutions must keep curricula current with industry needs and technological changes. In addition, once workers enter the workforce, they must keep their technical skills current. Who is responsible for ongoing education and the role between the employer and employee are issues that are not fully understood. However, the information technology industry has been plagued by chronic worker shortages while simultaneously experiencing rapid turnover in the workforce. The workforce problems facing the information industry are common to any industry that relies on technology to provide a competitive advantage.

To date, larger companies have been more successful in instituting workforce training programs and implementing technology into their manufacturing processes as small manufacturers, which employ the majority of the workforce, often do not have the resources to improve the job skills of their employees. The Michigan Manufacturing Technology Center has been working with the State's small and medium-

sized manufacturers to provide them with the job training services their employees require.

3. Witnesses

The Honorable Bruce Mehlman, Assistant Secretary, U.S. Department of Commerce, Washington, DC

Ms. Cindy Ballard, Director of Policy, Strategic Initiatives, Michigan Economic Development Corporation, Lansing, MI

Tim N. Clark, Director, Center for Manufacturing Improvement, Michigan Manufacturing Technology Center—Northeast, Saginaw Valley State University, University Center, MI

Robert Worthington, Sr., President, Globe Fire Sprinkler Corporation, Standish, MI

Chairman EHLERS. I now call this hearing of the Environment, Technology and Standards Subcommittee to order. I am pleased to welcome everyone here. It's especially an honor to have this subcommittee meeting, in the territory of Congressman Barcia.

I have known him for many years. We served together in the State House, the State Senate and now in the Congress. He is now stepping up to go back to the State Senate, at least that is his hope.

But I have to tell you that I think Congressman Barcia as the Ranking Member of the Subcommittee has been a real treat. The parliaments of Congress as the Ranking Member is the highest ranking Democrat—the highest ranking minority which now happens to be the Democrats.

So as Chairman, I have had to work closely with Mr. Barcia. He has been—I think we have probably formed the best Chairman/Ranking Member team in the Congress because we see eye-to-eye on so many things.

We put partisanship aside and we accomplished a lot. We passed some of Congressman Barcia's bills, passed some of my bills. But in all cases, we worked together on them to produce the product that's best for the people.

And I think we could, if more committees and subcommittees of the Congress work that way, get a tremendous amount done. So I was very pleased to agree to have a hearing in this district to discuss an issue that is dear to both of our hearts.

The process that we go through, in case you haven't been to a Congressional hearing, I will make an opening statement, Mr. Barcia will make an opening statement, roughly at five minutes long.

Then we will ask each of the witnesses to make their statement which is supposed to be five minutes in length or less. And if it's more, we smile for about the first 20, 30 seconds and then we start frowning after that. And eventually, the trap door behind them opens and they will just sort of disappear from sight.

Then after they have finished their five-minute statements, we will simply go right down the line, we will then have questions that Mr. Barcia and I will ask our panel of witnesses and they will have the ability to answer. We will proceed until Congressman Barcia and I have no further questions. Of course, our staff members will feed us questions, too.

We do not, in Congressional hearings, provide for participation from the audience. It is quite different from State House and Senate hearings where there is always an opportunity for the audience to ask questions. We do not have that in the Congress simply because of the present time there. However, if you have a few questions for any witness, you can discuss them with them afterwards. Or, you can submit a written question to us, and we will in turn submit it to the witnesses and they will respond to it and get that on the record.

So I will proceed with my opening statement.

I'm pleased to welcome you today to the field hearing of the Environment, Technology and Standards Subcommittee. My subcommittee normally convenes each month in the House Science Committee's hearing room in Washington, DC. It is certainly a change of pace to be able to hold this hearing in my home state.

Actually, I looked forward to a nice cool day in Michigan to hold a hearing instead of a hot day in Washington. Unfortunately, it's not working out that way.

I want to thank my colleague and friend, Congressman Barcia, for requesting this hearing, and I also want to thank Saginaw Valley State University for hosting us today. Mr. Barcia has chosen a timely and important topic for us to explore: How can Federal, State and local governments, as well as the private sector, ensure that America's workforce is well educated in math and science and continually trained to keep up with technology changes in the workplace? I have to interject here that I have spent a good share of my life in the past five years trying to improve math and science K-12 education in the country. We are continuing to make progress, but as usual proceeds at a snail's pace.

But in the present education bill we passed last year, HR-1, we made substantial improvements in math and science education and the efforts of the Federal Government there. This year I'm working on increasing the funding for that.

In addition, I have legislation that has passed in the House, along with legislation from Mr. Boehlert, Congressman Boehlert, Chairman of the Science Committee. We each have a bill. And we both passed the House, and we're working on getting those through the Senate. They will use the resources of the National Science Foundation to help improve math and science education.

So we have a two-pronged approach. The President's bill, dealing with the Department of Education, and Chairman Boehlert's bill and my bill, dealing with the National Science Foundation. Once the two are in effect and are funded, I expect there will be substantial improvements in teacher training and to a certain extent, curriculum development. We hope that will improve this.

Continuing on with the remainder of my written statement, we are a nation fueled by advances in science and technology. The tremendous economic growth and productivity gains of the past decade can be directly attributed to our Nation's scientific enterprise and advances in technology continue to transform the way we live and work. Our education system and the private sector both have key roles to play in ensuring that this enterprise is pursued.

The economic growth and productivity gains our nation has recently enjoyed will not be sustainable if our K-12 schools do not produce a scientifically literate workforce. Over the short term, the Congress has sought to alleviate our technical workforce shortage by increasing the number of H-1B visas for foreign scientists, technicians and engineers to work in this country.

The higher education community faces a similar problem where over half of enrolled graduate students in the sciences are foreign born. As industry struggles to find skilled workers in the short term, the long-term outlook is no better. The Department of Labor estimates that universities will have to produce four times more graduates in computer sciences to meet industry demand over the next decade. In addition, demands for scientists and engineers is expected to increase at a rate of more than double that of other occupations.

At the same time, I recently examined this and discovered that the number of graduates in computer science is decreasing, not in-

creasing. And the number of scientists and engineers graduating is full scale. The only growth rate is in the life sciences.

The challenge facing our K-12 schools is broader than simply developing a steady stream of highly skilled scientists, engineers and technicians to meet this long-term demand. Current and future workers of all sectors must have a broad set of basic science, math and technology skills.

Occupations once deemed low skilled now require higher-level course work in the math and sciences. For example, aspiring auto mechanics are now required to have course work in high school physics, computers and algebra. Across the occupational spectrum, an understanding of scientific and mathematical principles, a working knowledge of computer hardware and software, and the problem-solving skills developed by study in science, technology, engineering and math courses are basic skill requirements for most entry-level positions.

Ensuring that students possess strong math and science skills when they enter the workforce is only one aspect of the long-range challenge we face. Employees must think of a diploma not as an entitlement to a job, but rather it should be viewed as a learner's permit. Employers must also embrace this culture by encouraging training of employees throughout their careers. And clearly, Federal, State, and local government can play a role in providing training programs to ensure employees' skills meet industry demands.

Once again, our nation's educational system must do a better job of keeping pace with the demand of industry. *Training Magazine* estimates that in 1999, \$62.5 billion was spent by businesses on training, much of which was spent on the re-training of skills that should have been learned in school. Perhaps even more discouraging is a Hudson Institute estimate that 60 percent of all jobs in the early 21st Century will require skills possessed by only 20 percent of the current workforce, but the issue is not simply on economics. If we fail to provide our children with a solid education in math and science, the best jobs of the future will be out of their reach, and we will have failed our children.

I look forward to hearing from our witnesses on what challenges both employers and employees face in terms of education and continued training. And I might add that I feel very, very strongly about this issue. I spent 22 years as an educator at the college and university level. During that time, I spent a considerable amount of time working with elementary and secondary education in attempts to improve math and science education at that level. There is much to be done.

There are great opportunities for our children if they receive proper training. It doesn't have to be a Ph.D. It doesn't have to be graduate engineers, but simply understanding the basics of science and mathematics, learning how to think in those terms. Developing those mental capabilities including the analytical skills that one learns in that profession. It is a real key for employment for youngsters in the future, and we must do a better job.

[The prepared statement of Chairman Ehlers follows:]

PREPARED STATEMENT OF CHAIRMAN VERNON J. EHLERS

Welcome to today's field hearing of the Environment, Technology, and Standards Subcommittee. My Subcommittee normally convenes each month in the House Science Committee's hearing rooms in Washington D.C. It is a nice change of pace to be able to hold this hearing in my home state. I thank my colleague and friend, Congressman Barcia for requesting this hearing and also thank Saginaw Valley State University for hosting us today. Mr. Barcia has chosen a timely and important topic for us to explore: How can Federal, State, and local governments, as well as the private sector, ensure that America's workforce is well educated in math and science and continually trained to keep up with technology change in the workplace?

We are a nation fueled by advances in science and technology. The tremendous economic growth and productivity gains of the past decade can be directly attributed to our nation's scientific enterprise, and advances in technology continue to transform the way we live and work. Our education system and the private sector both have key roles to play in ensuring that this enterprise is pursued.

The economic growth and productivity gains our nation has recently enjoyed will not be sustainable if our K-12 schools do not produce a scientifically literate workforce. Over the short-term, the Congress has sought to alleviate our technical workforce shortage by increasing the number of H-1B visas for foreign scientists, technicians, and engineers to work in this country. The higher education community faces a similar problem, where over half of enrolled graduate students in the sciences are foreign born. As industry struggles to find skilled workers in the short term, the long-term outlook is no better. The Department of Labor estimates that universities will have to produce four times more graduates in computer sciences to meet industry demand over the next decade. In addition, demand for scientists and engineers is expected to increase at a rate of more than double that of other occupations.

The challenge facing our K-12 schools is broader than simply developing a steady stream of highly skilled scientists, engineers, and technicians to meet this long-term demand. Current and future workers of all sectors must have a broad set of basic science, math, and technology skills. Occupations once deemed low skilled now require higher level coursework in the math and sciences. For example, aspiring automobile mechanics are now required to have coursework in physics, computers, and algebra. Across the occupational spectrum, an understanding of scientific and mathematical principles, a working knowledge of computer hardware and software, and the problem-solving skills developed by study in science, technology, engineering and math courses are basic skill requirements for most entry-level positions.

Ensuring that students possess strong math and science skills when they enter the workforce is only one aspect of the long-term challenge we face. Employees must think of a diploma not as an entitlement to a job, rather it should be viewed as a learner's permit. Employers must also embrace this culture by encourage training of employees throughout their careers. And clearly Federal, State, and local government can play a role in providing training programs to ensure employee's skills meet industry demands.

Once again, our nation's educational system has must do a better job of keeping pace with the demand of industry. *Training Magazine* estimates that in 1999, \$62.5 billion was spent by businesses on training, much of which was spent on the retraining of skills that should have been learned in school. Perhaps even more discouraging is a Hudson Institute estimate that 60 percent of all jobs in the early 21st century will require skills possessed by only 20 percent of the current workforce. But the issue is not simply one of economics. If we fail to provide our children with a solid education in math and science, the best jobs of the future will be out of their reach, and we will have failed our children.

I look forward to hearing from our witnesses on what challenges both employers and employees face in terms of education and continued training.

Chairman EHLERS. I'm pleased now to recognize my colleague, Congressman Barcia, the Ranking Minority Member of the Environment, Technology, and Standards Subcommittee for an opening statement.

Mr. BARCIA. Thank you. Thank you, Chairman Ehlers. I want to thank you, Chairman Ehlers, for coming to Michigan today for this field hearing on the campus of Saginaw Valley State University where I think the timing is just perfect. If you look off to the left you'll see construction as we speak on a new \$40 million regional education and technology center. It is going to prepare not only

those professionals in education, but in the retraining of much of the existing classroom structures across this region, and indeed the State, who will have the opportunity to keep on top of the state-of-the-art technology development and information technologies that are becoming so routine each and every year in the field of education and higher education.

The new facility is going to, I think, establish Saginaw Valley State University's reputation even beyond and throughout the mid-west, but surely it will bring world-class status to this university campus. And I'm very proud of the Federal resources and the State resources that have come to the university to help achieve some of those goals. And, of course, for those of you who haven't been here before, we're very, very proud of this campus and the State university system.

I want to also thank you, Vern, for the privilege I've enjoyed as the Ranking Member of this very important subcommittee in the United States Congress. For those of you in the audience, I want you to know that the issue of the area of technology and information technology needs access to better training and skills toward the challenges that the information technology era, that we're in in the 21st Century, presents to our existing workforce and our graduating students both at the K-12 and higher levels. I truly have had a champion in Vern Ehlers for a long time. He was the only, I believe, physicist with a doctorate in physics in the Congress or the United States Senate. I think a few years ago, we got a Member from New Jersey.

But from the time that Vern arrived, which was about the same time I did back in 1993, in the Congress, Vern has played a lead role in guiding the Congress in becoming technologically literate. When just a few years before, Members of the Congress were still using typewriters, and mimeograph machines, and the old carbon paper and the new Speaker of the House, then new Speaker of the House, Newt Gingrich, asked Vern Ehlers to help prepare that transition for Congress. And I would have to say that it has been a success.

All of our offices are now receiving thousands and hundreds—well, thousands each, but hundreds daily E-mails. All kinds of new technology information at the disposal of the Members of Congress that really enhances the efficiency of the effectiveness of the staff, the very dedicated staffs, and the members themselves.

Vern has been a pleasure to work with. He's viewed as a very, very bipartisan chair and a privilege to work with. Thanks for being here in Saginaw County today and also thanks for the great working relationship that we've enjoyed. Also, the bipartisan nature that you've always employed when dealing on all of your committees, but especially on this subcommittee in moving some of our Democratic bills along as well as Republican bills along through the House and to the Senate.

I want to join Chairman Ehlers in welcoming everyone to this morning's hearing on workforce training. Chairman Ehlers, as you know, as I already mentioned, has been a leader in the Congress on science education issues and the need to increase the scientific literacy in K-12 education, and I want to thank him again for coming to Saginaw to chair this hearing.

I also want to thank Gene Hamilton and the very, very fine staff here at Saginaw Valley State University for their assistance in preparing for today's hearing. Although it's changed a bit since my days as a student here; I left in 1975 and there has been dramatic changes since that time. I'm always glad for the honor and chance to spend some time on the SVSU campus. It brings back a lot of great memories, and it's also an exciting opportunity to come out and see the dynamic change, and the growth in the student involvement and the quality of the education that is occurring here on the campus.

Today's hearing is about workforce training in a time of rapid technological change, so it's only fitting that we should be holding today's hearing on a university campus. Four-year undergraduate institutions, and community colleges are vital components in any meaningful workforce training agenda.

It used to be that your first job was often your last job. And during your career, the work environment didn't change that much in terms of the technical skills needed to perform your job. Whether you were working on a manufacturing line or in an office, the basic tools of your trade didn't change that much. The basic skills you learned in high school or college were largely sufficient to last throughout your career.

Today, of course, all of that has changed. Computers and information technologies have revolutionized every work environment. Even in Congress, the introduction of information technologies has allowed us to do our jobs more efficiently, but it has also forced every employee, myself included, to meet new demands on our time and learn new job skills to keep up with these technologies. Now, we videoconference. We're in constant touch with our offices through E-mail and cell phones. We have to master new computer software that just 20 years ago were the sole domain of a handful of computer scientists and data specialists. And as soon as we become familiar with one system, a new one is introduced requiring us to upgrade our job skills once again.

I think we in Congress have it easy. The challenges facing manufacturers and their employees are enormous, such as implementing eBusiness practices, quality control techniques such as statistical process control, and keeping pace with increasingly automated manufacturing equipment, all require efforts at education and training that are an order of magnitude more complex than simply learning the latest features of a word processing upgrade.

But companies and workers must successfully meet these challenges if they want to compete in today's global marketplace. To be competitive, it's not enough to work hard. We have to work smarter too. Businesses have learned that they must be lean and flexible if they want to stay competitive. New technologies allow companies to stay competitive, but at a high price in terms of upgrades to equipment and negotiating the complexities of an ever more technically sophisticated workplace.

People entering the workplace for the first time and people already in the workforce must continually upgrade their job skills. This is a new mindset for most Americans. What are the challenges and questions we need to answer? Is our educational system sufficiently flexible to help workers keep their skills set up to date? Do

our universities and community colleges have the funds and the resources to continually upgrade, not only course curricula, but their own infrastructure as well? Do our businesses know whom to turn to when they need to upgrade their employees' skills and do they trust them to provide good services? Do our high school students have the information they need to make good career decisions? And finally, what are the obstacles to people in the workforce upgrading their job skills?

I don't believe that skills development should occur once you've been laid off and are trying to find another job. That's not an effective way to maintain a skilled workforce. But these questions trouble me and I hope we can gather some answers through today's hearing.

In Michigan, we recognize the connection between a skilled workforce and economic success. Michigan's strong worker training programs have been key to maintaining our current manufacturing base. However, we need to do yet a better job. A recent report by the Michigan Economic Development Corporation says a shortage of skilled workers could be a long-term threat to Michigan's economic competitiveness.

In addition to maintaining our current manufacturing base, the State has also embarked on an ambitious plan to create a new base of high-wage jobs in emerging technology-intensive industries. Michigan is slated to spend some \$1 billion over the next 20 years on the Life Science Corridor to encourage the development and growth of biotech firms in Michigan. However, if this initiative is to be successful in the long-term, we must have the workforce with the skills to fill these biotech jobs.

We have a distinguished panel of witnesses who can talk about the challenges facing workers and businesses alike. Unfortunately, time constraints today prevented us from having all of the players, such as community colleges and our K-12 educators, to talk about this topic.

However, today's hearing begins a dialogue about the importance of this issue. I hope that we can come away from this hearing with a better understanding of how we can all work together, workers and employers, State and Federal Government, institutions of higher education and K-12 schools, to produce a robust economy. We all have a role to play, but I am convinced that we can only reach our vision if we all work together. Thank you, Mr. Chairman.

Chairman EHLERS. Thank you, Congressman Barcia.

[The prepared statement of Mr. Barcia follows:]

PREPARED STATEMENT OF REPRESENTATIVE JAMES A. BARCIA

I want to join Chairman Ehlers in welcoming everyone to this morning's hearing on workforce training. Chairman Ehlers has been a leader in the Congress on science education issues and the need to increase the scientific literacy in K-12 education and I want to thank him for coming to Saginaw to chair this hearing. I also want to thank Gene Hamilton and the staff of Saginaw Valley State University for their assistance in preparing for today's hearing. Although it's changed a bit since my days as a student, I'm always glad for the chance to spend some time on the SVSU campus.

Today's hearing is about workforce training in a time of rapid technological change. So, it's only fitting that we should be holding today's hearing on a university campus. 4-year undergraduate institutions, and community colleges are vital components in any meaningful workforce training agenda.

It used to be that your first job was often your last job, and during your career the work environment didn't change much in terms of the technical skills needed to perform your job. Whether you were working on a manufacturing line or in an office, the basic tools of your trade didn't change much. The basic skills you learned in high school or college were largely sufficient to last throughout your career.

Today, all that has changed. Computers and information technologies have revolutionized every work environment. Even in Congress, the introduction of information technologies has allowed us to do our jobs more efficiently, but it has also forced every employee—myself included—to meet new demands on our time and learn new job skills to keep up with the technologies. Now we videoconference, we are in constant touch with our offices through e-mail and cell phones, we have to master new computer softwares that just twenty years ago were the sole domain of a handful of computer scientists and data specialists.

And as soon as we become familiar with one system a new one is introduced requiring us to upgrade our job skills once again. And I think we in Congress have it easy. The challenges facing manufacturers and their employees are enormous, such as implementing eBusiness practices, quality control techniques such as statistical process control, and keeping pace with increasingly automated manufacturing equipment, all require efforts at education and training that are of orders of magnitude more complex than simply learning the latest features of a word processing upgrade. But companies and workers must successfully meet these challenges if they want to compete in today's global marketplace. To be competitive, it's not enough to work harder; we have to work smarter too. Businesses have learned that they must be lean and flexible if they want to stay competitive. New technologies allow companies to stay competitive, but at a high price in terms of upgrades to equipment and negotiating the complexities of an ever more technically sophisticated workplace.

People entering the workplace for the first-time and people already in the work force must continually upgrade their job skills. This is a new mindset for most Americans. What are the challenges and questions we need to answer? Is our educational system sufficiently flexible to help workers keep their skills sets up to date? Do our universities and community colleges have the funds and the resources to continually upgrade not only course curricula, but their own infrastructure too? Do our businesses know whom to turn to when they need up upgrade their employee's skills and do they trust them to provide good services? Do our high school students have the information they need to make good career decisions? And finally, what are the obstacles to people in the workforce upgrading their job skills? I don't believe that skills development should occur once you've been laid-off and are trying to find another job. That's not an effective way to maintain a skilled workforce. But these questions trouble me and I hope we can gather some answers through today's hearing.

In Michigan, we recognize the connection between a skilled workforce and economic success. Michigan's strong worker training programs have been key to maintaining our current manufacturing base. However, we need to do a better job. A recent report by the Michigan Economic Development Corporation says a shortage of skilled workers could be a long-term threat to Michigan's economic competitiveness. In addition to maintaining our current manufacturing base, the state has also embarked on an ambitious plan to create a new base of high-wage jobs in emerging technology-intensive industries. Michigan is slated to spend \$1 billion over the next 20 years on the Life Science Corridor to encourage the development and growth of biotech firms in Michigan. However, if this initiative is to be successful in the long-term, we must have the workforce with the skills to fill these biotech jobs.

We have a distinguished panel of witnesses who can talk about the challenges facing workers and business. Unfortunately, time constraints today prevented us from having all the players, such as community colleges and our K-12 educators, to talk about this topic. However, today's hearing begins a dialogue about the importance of this issue. I hope that we can come away from this hearing with a better understanding of how we can all work together, workers and employers, State and Federal Government, institutions of higher education and K-12 schools, to produce a robust economy. We all have a role to play, but I am convinced that we can only reach our vision if we all work together.

Chairman EHLERS. Let me also just take a minute to thank you for your comments about my work on the computerization of the House and I will—since this audience is interested on improvement of the workforce, let me just explain something. Before I got to the Congress, I heard from constituents regularly that Congress is just

out of touch with people. And when I got there, I began to understand why. It was in 1993. Congress was not connected to the internet. If you wanted to have E-mail, you had to use AOL or something else like that. And actually, it was easier for me to send an E-mail to Moscow than to send it 20 feet down the hall to another colleague. So I was given the thankless job of putting in a system.

We did it. It's not easy to network 11,000 computers, but we got on the internet. We have E-mail. We are now over 10 million E-mails a month, about two thirds of which is from staff-to-staff. And remember, every one of those E-mails replaces either a phone call or a written note being sent through the House mail system.

The efficiency has gone up. Our staff has one and a half less staff Members from my office than we had before and we're getting a lot more work done. And I think that story is repeated throughout the Congress.

The interesting thing is the websites. We are getting about a hundred million hits a year on the House Website. We get five hundred million hits a year on the library of Congress site which is all the Congressional documents, and that is a lot of hits. But we're talking about an average American hits the Congress websites four times a year. No, not everyone hits it. Some hit it many times. But I think you can no longer say that Congress is out of touch, because today, someone can sit in their living room, watch the proceedings on television and C-SPAN. If they're interested in the bill under discussion, they can go on the computer and download the bill or the amendment, formulate an opinion, send up an E-mail to their Member of Congress before the bill is even voted on. And I don't think anyone ever envisioned that when George Washington and some others started the country.

Having said that, giving the sales pitch, I am now pleased to introduce our witnesses. First, we have the Honorable Bruce Mehlman, Assistant Secretary at the United States Department of Commerce who is kind enough to come from Washington to testify. He has great responsibilities in the area we will be discussing.

Next, Ms. Cindy Ballard, Director of Policy for Strategic Initiatives at the Michigan Economic Development Corporation.

Third, we have Mr. Tim Clark, Director of the Center for Manufacturing Improvement, it's out of Saginaw Valley State University, who probably had to travel the least distance to get here.

And for the final witness, I'm going to yield to Mr. Barcia to introduce Mr. Robert Worthington.

Mr. BARCIA. I want to thank the entire panel today for sharing their very, very precious and valuable time with us, sharing their expertise most importantly. But it is a pleasure for me to introduce someone who has been a friend for many years and someone who's really made a difference in Arenac County in terms of career opportunities up there for the workforce. Not only that, but a tremendous economic impact on the economy of Arenac County in Northeastern Michigan, and that's Mr. Robert Worthington, who is the CEO and President of Globe Fire Sprinkler Corporation in Standish, Michigan. He has been in the fire sprinkler industry for almost 50 years. Of course, he started when he was only five. But the last 14 years that becomes Globe's Manufacturing Process.

He has served on the National Fire Sprinkler Association's Board of Directors and the Manufacturers' Council. He has also provided the training in the use of the first mini-computers for pipeline hydraulics and grid systems in Europe and the United States.

I also want to add that the Science Committee has been deeply involved in the fire safety protection during the course of its investigation of the structural causes of the collapse of the buildings at the World Trade Center.

And I will say that Bob has provided leadership at both the international and national level in the area of fire suppression and basically public safety issues with regard to construction of hotels literally around the world of new commercial construction and has brought great claim to the State of Michigan in terms of the leadership and the expertise that he has provided.

So Bob, we're delighted that you can take time away from the many, many responsibilities that you have back at the company back in the Standish corporation and be with us to share your thoughts on what we might do to work better together to coordinate our resources and our efforts to prepare those emerging workforce employees, as well as those who are already on the job, to keep those skills state of the art so that we can continue to be a global super power in the international economy.

Chairman EHLERS. Thank you, Mr. Barcia.

At this point, we will turn to our witnesses for their testimony, five minutes each as I mentioned earlier, and after that we will open for questions. Mr. Mehlman, will you begin?

**STATEMENT OF BRUCE P. MEHLMAN, ASSISTANT SECRETARY,
UNITED STATES DEPARTMENT OF COMMERCE**

Mr. MEHLMAN. Thank you. Chairman Ehlers and representative Barcia, thanks for inviting me here today. It's an honor to testify before you.

At the Commerce Department, I'm privileged to lead the Office of Technology Policy, which is the policy arm of the Technology Administration. OTP seeks to maximize technology's contribution to America's economic growth and productivity, innovation capacity and global competitiveness.

While we work on a broad spectrum of issues every day, I try to focus on four questions. First, how can the United States retain its global innovational leadership? Second, how can regions and communities best support technology clusters and entrepreneurs? Third, how can we accelerate the use of broad band applications to maximize productivity and competitiveness? And, fourth, with a thanks for both of your leadership here, how can we get more American students pursuing careers in math, science and engineering? The importance of the issues before us today can't be overstated, and I believe it falls squarely at the intersection of these four questions.

The fact is that the wealth of nations is changing. During the industrial era, national wealth was defined by natural resource abundance and the strength of the manufacturing base. The next 100 years promises to be an age of innovation where global competitiveness is defined by innovation capacity, university strength, R&D capabilities, regimes for protecting and commercializing intellectual

property, network connectivity, and perhaps the most significant, the ability to produce, attract, retain and maintain a world-class workforce.

If America is to keep its tech leadership, it's going to need to develop, attract the best and brightest knowledge workers. The need is particularly acute in the information technology space since IT is a critical enabler for innovation and productivity with outside economic impact.

In the United States, for example, the IT sector accounts for just seven percent of the businesses in our economy. But between '96 and 2000, it drove 28 percent of overall United States real economic growth. It generated two-thirds of the surge in productivity growth that Congressman Barcia described, reduced inflation and created jobs at twice the pace of other sectors, jobs that on average pay twice as much. Yet, IT is a dynamic field marked by accelerated change and constant disruption which creates a challenge for IT workers and employers.

My office is soon going to release a report on IT workforce training programs. An analysis based on exhaustive research, round tables around the country and more than 445 responses from stakeholders. Our report will note the following workforce readiness challenges faced by IT employers and employees.

For employers, the biggest IT workforce training challenges include the fact that worker training fails to solve the immediate challenge for an industry that is marked by just-in-time demands. Competitive pressures, short product cycles and customer deadlines require employees to hit the ground running which makes experience the number one criteria for hiring.

Worker training takes time away from profit generating work and is expensive, especially for small business and low margin players. Worker training does not guarantee a competitive edge, many employers say, since many competitors simply hire away skilled workers after training, especially when labor markets are tight.

Specific skill needs change rapidly, and existing workers can't always adapt to retrain to new needs. For example, when Y2K was pending with the COBALT programmers to deal with the Y2K bug, the e-commerce and database specialists were in great demand. Presently XML, wireless and security experts are most needed. Today's critical expert may lack the expertise needed tomorrow, and the path for transforming the specialist's speciality is yet unclear.

For current employees, the top challenges we've heard include training in new fields is expensive and takes time, and many employers can't afford to pay or make the time available during working hours. And existing specialties don't always translate to expertise in the next hot area and existing expertise loses value over time.

The central importance of IT of all systems means employees need more than technical expertise; they need soft skills such as the ability to communicate and to work in teams, to understand systems and business challenges and the ability to lead as the change is needed in the organization. And although extensive and diverse, the IT training landscape presents an often hard to navigate maze of offerings.

For new employees, IT workforce challenges include landing a job without real world experience which is difficult due to the chicken and egg phenomenon; low salaries, especially for new IT workers who formerly worked in other occupations that are trying to make a transition and expect higher wages; and the filling of specific technical expertise and experience using IT since Bachelor's degrees are both essential but they often fail to confer specific technical expertise.

In the 21st Century, innovations will come faster, disruptions will cut deeper and the ability to cope with change, to learn and adapt, will be the defining characteristics of successful workers and economies. While IT will remain on the cutting edge, the challenges it faces will be indicative of the challenges faced throughout the rest of the economy.

But lest we become too disheartened by these challenges, we need to remember that the real explosion of IT is still a fairly new phenomenon resulting from convergence of networking applications on the Internet, increases in computing power and storage capabilities. Employers, workers and governments are pursuing many different models of workforce training at this time, and only time is going to tell us which are most effective.

Personally, I remain very confident, believing that companies and regions that invest in training will reap the rewards in worker loyalty and productivity. Powerful web-based learning tools will empower employees to provide a challenge to maintain workforce readiness, and the younger digital generation will prove extraordinarily able to adapt to change and master new technologies. Thank you.

Chairman EHLERS. Thank you very much.

[The prepared statement of Mr. Mehlman follows:]

PREPARED STATEMENT OF BRUCE P. MEHLMAN

Mr. Chairman and Representative Barcia, it is an honor to appear before you today to discuss education and training for information technology (IT) professionals. Examples of these workers include computer scientists and engineers, computer programmers, systems analysts, computer support specialists, network administrators, and data base administrators.

Rapid advances in digital technologies and their widespread deployment throughout the economy have fueled explosive growth in the demand for workers skilled in the development and use of IT. A high rate of growth in these occupations is expected to continue. The ten-year occupational employment projections prepared by the U.S. Department of Labor's Bureau of Labor Statistics (BLS) indicate that, between 2000 and 2010, 2.5 million new IT workers will be needed to fill new IT jobs and to replace workers leaving the profession. There has been concern about ensuring that we have a world-class science and engineering workforce for our knowledge-based economy. This too is an IT workforce challenge. In the newly released *Science & Engineering Indicators*, the National Science Board wrote that "Approximately 86 percent of the increase in science and engineering jobs (during 2000-2010) will likely occur in computer-related occupations."

Based on its own occupational employment forecasts, Michigan will need an estimated 58,440 highly skilled IT professionals between 1998-2008, nearly 6,000 per year. These workers will be needed across the industrial landscape and, of course, increasingly in Michigan's bedrock industry, the automotive industry. The IEEE estimates that, in 1977, that value of electronics in vehicles averaged \$110; that figure has increased to \$1,800. IEEE estimates that the cost of electronics in today's luxury vehicles can amount to more than 23 percent of total manufacturing costs, and some estimate that more than 80 percent of all automotive innovation now stems from electronics. Clearly, with the economy, the growth and competitiveness of our companies, and the productivity of our organizations increasingly dependent on IT,

it is vital that we have a world-class IT workforce and an IT education and training infrastructure that can keep that workforce's skills up-to-date.

The American Competitiveness in the 21st Century Act of 2000 directed the Secretary of Commerce to conduct a review of high-tech workforce training programs in the United States and prepare a report of findings. In response to this mandate, the Technology Administration conducted an extensive review that focused on the education and training paths and programs through which Americans prepare for IT jobs and maintain the skills needed in an ever changing digital technology environment. Specifically, the review explored IT worker demand in terms of education and skills requirements, especially as articulated by employers, and various models for providing IT education and training. We hope to publish the report later this summer.

We used a variety of mechanisms to obtain balanced and in-depth information from a broad base of stakeholder groups—employers, IT workers, education and training providers, governments, and area and regional partnerships. Our review—conducted through a formal request for comments supported by a web-based questionnaire, roundtables with both employer and employee groups, meetings with experts and IT training program representatives, data analysis, and literature and website review—generated 445 responses from stakeholders. These responders came from more than 25 different U.S. IT-producing and non-IT producing industries, with small, medium and large employers represented. In addition, the eight roundtables were convened in geographic areas that drew participants from nine of the top 12 metropolitan statistical areas with the largest populations of professional-level IT workers. Both the roundtables and the request for comments provided a rich and diverse array of knowledge and views.

We first sought to examine the education and skills employers seek in IT workers. These are the skill, knowledge, and experience requirements that IT education and training providers are working to fulfill.

The IT workforce, and IT education and skills, are often discussed as if they were homogeneous in nature. In reality, the mix of knowledge and skills required can vary significantly from one IT job to another, in terms of the specific technical skills needed, industry knowledge and experience, and other qualifications in areas such as project management, communications, and organizational skills. Thus, IT workers qualified for one job often do not qualify for another. Typically, employers seek IT workers who possess a specific combination of formal education, technical skills, non-technical knowledge and skills, and experience. These requirements create IT jobs that are highly specialized, with employers seeking an exact skills fit. IT workers who participated in our web-based questionnaire cited employer demand for exact match to a specialized skill set as a major barrier they face in obtaining IT jobs.

What Do Employers Seek?

College Graduates. Notwithstanding the occasional news of high school students succeeding in the IT field, employers generally seek candidates with post-secondary education for professional level IT jobs. The strong demand for IT job candidates with at least a Bachelor's degree is expected to continue. BLS projects that almost three-quarters of the job openings for professional IT workers between 2000 and 2010 will require at least a Bachelor's degree.

Two-thirds of the current IT workforce holds a Bachelor's or higher-level degree and, among these workers, there is a great diversity in the types of degrees they hold. However, the vast majority has degrees in science, math or engineering disciplines, indicative of the high knowledge and high skill requirements of professional-level IT work.

Workers with 4-year technical degrees—such as in computer science or computer engineering—are often preferred for jobs involving research, or for developing new software, IT products, or enterprise-level applications. The complexity of these tasks causes employers to seek workers with deeper and more theoretical knowledge. This foundational knowledge is also thought to enable IT workers to create more robust IT systems, and to readily learn new technical skills when technology changes. Employers also believe that workers with four-year degrees know how to think critically, have problem-solving skills, can communicate orally and in writing, and possess other attributes that indicate "work readiness" for professional level jobs.

Other surveys and analyses suggest that employers show some willingness to hire individuals without a Bachelor's degree—for example, those with a 2-year degree—for jobs in technical support, web development and administration, some database related jobs, and some jobs in network design and administration, although there would often be a requirement for previous work experience and/or a technical skill certification.

Technical Skills. A rapidly growing array of IT products and services for industries and consumer markets has created the need for IT workers who possess a highly specialized combination of technical knowledge and skills. This may include certification in vendor-specific technologies. Employers place a high priority on these technical skills. With IT skill sets closely linked to specific software and hardware technologies, ever shortening product life cycles create high-levels of change in the IT skill mix in demand. These technical skills lose their value overtime, sometimes in as little as 2-3 years. As a result, IT workers must acquire new skills frequently in order to maintain their labor market viability.

Non-Technical/Soft Skills. As IT has become ubiquitous throughout organizations and central to mission-critical operations, employers have placed an increasing emphasis on IT workers' business skills and soft skills. These include soft skills such as interpersonal skills, oral and written communications, teamwork, problem-solving and critical thinking, and business skills such as needs analysis, project management, client-customer relations, understanding company financial information, and cost-benefit analysis.

Experience. Among employers and IT workers, if there is one area of unanimity about IT labor market conditions, it is the importance of work experience. Experience is a high, if not the highest priority, in employer hiring considerations. For example, in a recent analysis by Techies.com—which hosts an IT job recruitment database—about 90 percent of jobs listed asked for three or more years of experience. Other analyses have shown the percentage of IT job vacancies for experienced workers ranged from 70 to 80 percent. Employers at our roundtables reported similar recruitment practices. The experience requirement can even extend to new workforce entrants, such as recent college graduates. Some employers are willing to take a chance on newly trained, but inexperienced IT workers for lower level jobs at the lower end of the pay range. They may be willing to accept academic degrees, demonstrated soft skills, or IT certifications that closely match their need in lieu of job experience. But, as the job level rises, employers' willingness to accept substitutes for experience decreases significantly.

Employers insist on experienced job candidates as timesaving and risk reduction strategies. With short product-life cycles, customer deadlines, and competitive pressures, employers seek IT workers who can, as we heard many times, "hit the ground running." Employers believe that competency is best substantiated through a track record of getting things done as demonstrated through actual job experience. IT workers also see great value in experience. They believe experience is the best teacher for continuing in an IT career, and they place a high priority on learning IT in a real workplace, with real projects and problems, through "hands-on" on-the-job training.

Because of job skill complexity and rapid skill change in the IT profession, IT education and training providers need very good information on the knowledge, skills, and experiences employers seek in IT workers. A number of jurisdictions—including Arkansas, the Washington, D.C. metropolitan area, Arizona, Ohio, San Diego, Omaha, and Virginia—undertook studies to ascertain what knowledge and skills employers in their regions sought in IT workers. These studies focused, either solely or in combination, on the specific technical skills in demand, formal degree requirements, soft skills, business knowledge desired, as well as the levels of basic skills such as reading, mathematics, and writing needed. These studies were designed to provide the information needed to better align a region's IT education and training programs with the needs of area employers.

The IT Education and Training Landscape

To meet the high demand for skilled IT workers, the IT education and training infrastructure has grown significantly over the past decade, and continues to expand. A wide range of education and training opportunities are available nationwide for workers who want to train to enter the IT field, and for IT workers who want to expand or update their skills. Yet, this rich and diverse collection of education and training opportunities often presents a confusing maze, in trying to ascertain what type of program, format, provider, or credential will best meet the needs of workers training to enter the field, the needs of IT workers seeking to add to their skills, or the needs of employers seeking training for the workforce.

Different IT education and training programs do different things. Some—such as formal college programs in computer science—provide deep foundational knowledge in IT that is suited for those who will be working at advanced levels in the field. Some programs are focused on teaching a particular IT discipline such as networking or databases. Other programs provide very narrow training, for example, training on a specific vendor's technology, which may be useful to an IT worker who wants to quickly get up to speed on a new IT product. In short, in IT education and

training, there is no "one-size fits all" and there are no easy ways to navigate the maze of IT education and training offerings. Moreover, there are few career roadmaps to guide workers in career development.

Examples of Popular IT Education and Training Models

Four-Year Computer Science Degree Programs. These programs provide deep foundational knowledge in IT. However, these programs are less focused on the day-to-day aspects of IT that employers value, such as business concepts and soft skills. Computer information systems degree programs, and private for-profit IT colleges offer education and training on the practical aspects of implementing and managing IT in organizations.

IT-Related Master of Science (MS) Programs. These MS programs typically are designed for either working professionals, or to prepare students for study at the doctoral level. Some MS programs offer preparation for advancement to higher-level jobs, such as those in IT organization management and IT business management, or for more technically complex jobs such as advanced IT development work. Other IT-related MS programs are geared toward expanding IT professionals' portfolio of skills into new IT disciplines, such as telecommunications or e-commerce, or to prepare them for work in a highly specialized IT applications area such as bioinformatics, scientific computing, data mining, IT security, or multimedia.

Two-Year IT-related Degrees/Community Colleges. Community colleges offer a range of IT education and training opportunities. These IT programs are popular, in part, because they are convenient, economical, and offer opportunities for both full-time students and working adults seeking to upgrade their skills or prepare for a career change by attending training on a part-time basis. Community college offerings provide preparation primarily for low and intermediate-skilled IT jobs, and often focus on more practical applications of IT, as opposed to more theoretical studies.

Community colleges educate computer science and computer information systems management degree-seeking students, retrain current IT workers, train workers who are changing from one career to an IT career, and train those with Bachelor's degrees who need technical skills. Some students do pursue an Associate degree in an IT field, but only a small share of those enrolled in community college IT programs obtain the degree. Many students enroll to gain the knowledge and skill.

Two types of IT degree tracks are offered at community colleges—terminal and transfer. *Transfer* tracks, focused on computer science or computer information systems management, prepare students for transfer to an IT program at a four-year college or university, working toward a Bachelor's degree in computer science, computer engineering, or management information systems. *Terminal* tracks are designed for students who intend to move on to employment after achieving their two-year degree. These programs—which often focus on programming, network and database administration, and technical support—have a higher concentration of courses in the technical discipline. The curricula place less emphasis on concepts and theory compared to transfer programs, and place greater emphasis on practical knowledge. These terminal degree programs can prepare students for entry-level jobs in their specialization. However, these students may face challenges in adapting to technological change or moving into different IT disciplines.

IT Certificate Programs. IT certificate programs are offered at many universities and community colleges. These adult continuing education programs typically specialize in providing in-depth teaching in some particular IT specialty such as networking, e-commerce, or IT security; in a specific technical skill area such as Java or C++ programming; or in a particular vendor's technology such as Oracle databases. These concentrated programs of study can add depth to an IT worker's knowledge and skill in a particular specialized IT discipline, or help an IT worker expand his or her breadth of skills into new discipline areas. Individuals may enroll in these programs with the aim of entering the IT profession, entering a new industry, expanding their skill portfolio, career advancement, or learning how to use a specific kind of IT. Some certificate programs offer credit toward degrees.

Vendor and Vendor-Neutral Certification Training. During the past decade, a new form of credentialing—certification—emerged in the IT profession, and has grown increasingly popular. These credentials are typically earned by passing examinations. A certification provides independent verification that its bearer has achieved a certain level of expertise in a particular IT discipline, or a specific set of skills and knowledge that relates to a specific software or hardware product. There are certifications in many areas of IT, including networking, database development and administration, IT support, wireless, operating systems, IT security, programming, and more. There are certifications focused on particular vendor's products; Microsoft, Oracle, Cisco, and Novell are among the most popular.

A very large number of training providers now prepare IT workers for these examinations: four-year college and universities, community colleges, private computer colleges and schools, high school IT academies, on-line training providers, and others. IT vendors—such as Microsoft, Cisco, Oracle, Novell, and Sun—have helped catalyze the industry for preparing people for certification in their technologies, for example, by developing “official” courseware and curricula, and through “authorized” training provider programs. IT workers report that these programs can provide effective, deep-dive training for learning a particular vendor’s technology in a relatively short time frame. However, this kind of training is often narrow in nature and does not provide the IT foundations needed for long-term success in the field.

Other. In addition, IT workers can acquire skills through: a wide range of on-line education and training, including complete on-line IT degree programs; computer-based training; short seminars and fast track programs from community colleges and private training providers; and a wide range of books and Internet-based tutorials for self education.

Some employers have programs in place to create the IT workers they need. We examined two successful programs in the financial community. After extensive screening, small groups of candidates with college degrees and work experience are chosen and provided with 18 months of customized training. However, while employers report that these programs are quite successful, they are also quite expensive, costing approximately \$30,000 per trainee.

The Federal Government does support some IT worker education and training, for example, funding education and training through the fees employers pay for H-1B visas. Some of these funds are used for grants for training initiatives around the country, which typically are focused on entry-level training. Some of these funds are used to provide scholarships for disadvantaged students studying computer science, mathematics, and engineering. Another government funded effort—MetroTech which operates in the Washington, DC metropolitan area—funds the training of workers, frequently current IT workers, to acquire specific skills that will meet the needs of employers who have agreed to hire the workers if the skills are acquired. Some states have also funded IT training initiatives in recent years.

Michigan has a wide variety of IT education and training opportunities. The State’s universities such as the University of Michigan, Ferris State, Wayne State, and others, have four-year degree programs in computer science, and four-year degree programs in the business-focused computer information systems. Wayne State offers an IT minor for students who are majoring in other fields of study in the College of Sciences. Masters programs are available in fields such as computer science, information systems management, as well as in hardware, software, intelligent systems, and theory. In Michigan’s community college system, there are two-year computer science and computer information systems transfer programs, and two-year terminal degree programs in IT areas such as network administration, computer programming, multimedia, computer support, e-commerce, database administration, computer graphics, computer security, and more. These community colleges also offer certificate programs in network administration, computer applications, web design and development, computer programming, Unix systems administration, e-commerce, as well as training for IT certification including preparation for the popular A+, Microsoft Certified Systems Engineer, Certified Novell Administrator, and Oracle Data Base Administrator. A number of community colleges and high schools in Michigan operate Cisco Networking Academies. In addition, a wide range of training for the IT professional is available from private training providers. For example, a search for Java training through Michigan’s Career Education Consumer Report database turned up 22 training programs. And, there is the innovative Michigan Virtual University Information Technology Training Initiative which provides students and teachers in the state access to hundreds of web-based courses to prepare for IT certification, or learn database technologies, Internet and web development, networking and operating systems, and programming languages.

Right here at Saginaw Valley State University, students can pursue Bachelor’s degrees in computer science and computer information systems. Let me mention that both of these programs require students to take courses on fundamentals of communications and technical report writing, building some of the soft skills employers value. The School’s Center for Corporate and Professional Development offers training to prepare for several popular certifications such as A+, Microsoft Certified Systems Engineer, and Certified Novell Administrator, as well as one day workshops on specific IT skills. Clearly, current and prospective IT workers in Michigan have a wide range of education and training opportunities they can access.

Challenges for IT Workers and Their Employers

Both prospective and current IT workers face challenges in acquiring their IT skills and keeping them up-to-date.

Workers who wish to train to enter the IT field face several challenges. First, given the wide variety of IT education and training opportunities, workers may have difficulty navigating the landscape and choosing the types of training that would give them the best chance of entering the profession with a solid foundation in computing, specific technical skills in current demand, and the business and soft skills employers want. In addition, they need to develop a learning path that will provide them with the knowledge and skills they need to advance in the field, adapt to technical change, or expand their portfolio of skills into new IT disciplines. These workers may wish to avoid training that provides only a narrow set of technical skills that will be viable in the labor market for only a few years. Another challenge for those trying to enter the IT field is overcoming employers' preference for hiring workers who have job experience in applying the sought after technical skills. This challenge highlights the importance of including work-study and internships in the course of prospective IT workers' education and training.

IT workers already in the field may also have difficulty navigating the IT education and training landscape. While they typically have an idea about the types of skills they need to acquire, finding the right program can be difficult, even choosing among a number of programs claiming to provide similar skills training. For example, in searching Michigan's Career Education Consumer Report database, programs that indicate they provide preparation for the Microsoft Certified Systems Engineer exam range in price from \$4,000 to more than \$15,000. When they acquire new technical skills from training, current IT workers also face the challenge of employers' preference for workers who have job experience in applying the skills.

Current IT workers face time and money challenges in keeping their skills up-to-date. IT workers reported that they spent several hours or more per week working to keep their skills up to date, and attending a training class can cost thousands of dollars. Many workers must pursue training on their own time and at their own expense. Many employers who are operating with lean staffing do not have the time to allow their workers to attend skills training on company time, while others lack the budget for training funds adequate to cover IT training that can cost thousands of dollars per worker. The smaller the company typically, the more difficult that becomes. We heard from a number of employers that employees need to take responsibility for their own training and career development, while employees would understandably prefer that employers share these burdens. The time and cost of ongoing skills development can be burdensome for IT workers with other responsibilities, such as a family.

IT training may not always be offered at times convenient for working adults, or in a time frame that is needed. For example, an IT worker may need to acquire the new skill set quickly, but he or she may not be able to attend that training at the local community college until the next semester begins or because it is part of a larger 3 or 6 month course curriculum. IT workers indicated that it is important to apply new skills as soon as they are learned; if they have to wait a while to apply new technical skills, they begin to forget them. IT workers who wish to advance to IT management often need not only a Bachelor's degree, but need to expand their knowledge and skill in business areas such as project management, cost-benefit analysis, business functions, and people management.

As evidenced by their answers to our questionnaire, the H-1B program is of particular concern to many U.S. IT workers who believe that the increasing number of foreign IT workers entering the United States on H-1B visas is costing American IT workers jobs and negatively affecting their wages. Several respondents indicated that there was little point in their acquiring new IT skills because they believed they could not compete for IT jobs against H-1B workers. At the same time, IT employers and producers continue to point to this programs as essential for getting the best and brightest IT workers in a dynamic and changing marketplace.

Many employers face frequent changes in their needed skill mix, and one of their biggest challenges is finding "the right person, with the right skills, at the right time." This not only means job candidates with the right combination of technical skills but, increasingly, with an array of business and soft skills that employers value. In addition, as they rely on outside education and training providers to meet their changing skill needs, employers need to take a more active role in expressing those needs to those who seek to fulfill them. Yet, many employers do not participate in mechanisms to provide information about their needs to education and training providers, and many do not participate in work-study or internships programs that provide prospective workers with the job experience employers say they want job candidates to possess.

Are These Challenges Faced By All U.S. Enterprises?

Most U.S. enterprises face these challenges to some degree, because most U.S. enterprises need IT workers. These challenges are most acute for employers for which IT is their core business. While product and technology life cycles have decreased across all industry sectors, time pressures are among the most intense for IT product and service producers. These companies confront life cycles or project deadlines that are often measured in months. Not only do these firms contend with very short product life cycles, intense competitive pressures, or pressure from customers to bring projects in on time and within budget, these employers have a high level of IT worker intensity in their workforce. For example, half of all workers in the computer and data processing services industry are skilled IT professionals. These employers are more likely to seek job candidates with exact skill fit who can be productive right away.

Other employers of IT workers focus on the application of information technologies to enhance their core businesses in other fields, such as insurance, banking, retail, or manufacturing. These firms typically have lower IT worker intensity, often have more stable employment environments and longer IT life cycles and, thus, have greater ability to nurture their skill base by investing in training. However, since they share the same labor pool with firms whose core business is IT, they are buffeted by the actions of others. They, too, risk losing employees to other employers and may also have to pay premiums to acquire and retain certain IT skills, especially the ones most in demand.

Nearly all jobs in our economy are being affected by technological change, and employees in many fields need to frequently upgrade their skills. However, while product and technological life cycles have decreased across all industry sectors, the rate of technical change in the IT field is among the fastest, putting significant pressure on IT workers to keep their skills up-to-date. In addition, the rapidly growing array of IT products and service for different industries and consumer markets has driven a relatively high level of specialization in the IT labor market.

I cannot predict if or when the speed of change and skill specialization characteristic of IT occupations will come to characterize some other or all occupations. Technological change is unpredictable. But I am confident saying this. The economy is undergoing a fundamental transformation. We are shifting to what Alan Greenspan has called a "conceptual-based economy," where knowledge, information, and ideas are the most important factors of production.

Employees use a growing array of advanced information, telecommunications, and manufacturing technologies. New forms of work organization and management are replacing hierarchical organizations, chain-of-command communications, and narrow, repetitive jobs. Many employers are adopting management and organization systems that empower workers with greater responsibility, authority, and accountability. The knowledge and technology components of products and services are growing. In fact, the management of the whole supply chain—from raw material to customer delivery—has become reliant on knowledge and technology. Technology and knowledge are increasingly used to raise the value of and differentiate services, for example through on-line purchasing, help desks, and distributed learning. These advances in technology, new systems of work, and new ways to deliver products and services are changing what people do on the job and increasing the skills they need.

Today, employers expect employees to possess the basics of reading, writing, and computation. Computer skills are well on their way to becoming baseline requirements for many jobs. The new management paradigms require a broad portfolio of skills in addition to the academic and technical—including the ability to learn; adaptability, problem-solving, and critical thinking; the ability to set goals and motivate oneself; and the ability to work effectively in groups. Unfortunately, too many Americans are not prepared for jobs in the new economy.

It is incumbent upon us in government at all levels and in industry to ensure that our education and training system can offer them the knowledge and skills they need to be productive and successful, and we are trying to do that. Thank you.

ASSISTANT SECRETARY

OFFICE OF TECHNOLOGY POLICY
TECHNOLOGY ADMINISTRATION

Bruce P. Mehlman serves as Assistant Secretary of Commerce for Technology Policy. Nominated by President Bush on April 30, 2001, he was confirmed by the Senate on May 25, 2001. Assistant Secretary Mehlman leads the Office of Technology Policy within the United States Department of Commerce's Technology Administration.



The Office of Technology Policy (OTP) strives to maximize technology's contribution to U.S. economic growth, productivity, innovative capacity and global competitiveness. OTP works closely with leaders from industry, federal labs and universities and state, federal and international governments on critical policy issues impacting technology creators and users. Among other priorities, Bruce is focusing on four fundamental questions:

- How can the United States retain its global innovation leadership in the 21st Century?
- How can regions and communities in the U.S. and around the world best support knowledge clusters and technology entrepreneurship?
- How can we accelerate usage of broadband (high-speed Internet) applications to maximize organizational productivity, competitiveness and societal benefit?
- How can we get more American students studying and pursuing careers in math, science and engineering to maximize the long-term competitiveness of our knowledge workforce?

Prior to joining the Department of Commerce, Mehlman served as Telecommunications Policy Counsel for Cisco Systems, Inc. At Cisco, Mehlman worked with public policy leaders and technologists throughout the information technology community on issues of broadband deployment, wireless networking, e-commerce strategies and Internet policy.

Before joining Cisco Systems, Assistant Secretary Mehlman served as Policy Director and General Counsel at the House Republican Conference the House of Representatives' leadership office headed by Oklahoma Congressman J.C. Watts, Jr.. At the Conference Mehlman worked with leadership to help pass Y2K and China trade legislation, while organizing high technology education and outreach efforts for senior leadership and committee staff.

Assistant Secretary Mehlman formerly served as General Counsel of the National Republican Congressional Committee under Chairmen Bill Paxon (NY) and John Linder (GA), focusing on election law, political broadcast regulations and Congressional ethics. He also worked as a commercial litigation attorney in the Washington, D.C. law firm of Wiley, Rein & Fielding.

Assistant Secretary Mehlman received his B.A. from Princeton University and his J.D. from the University of Virginia School of Law.

Chairman EHLERS. Ms. Ballard?

STATEMENT OF CINDY BALLARD, DIRECTOR OF POLICY, STRATEGIC INITIATIVES, MICHIGAN ECONOMIC DEVELOPMENT CORPORATION

Ms. BALLARD. Good morning, and thank you for the opportunity to testify this morning. A skilled workforce is a critical concern to Michigan's economic development workers, and we're pleased that the subcommittee is examining current training needs and the role of the Federal Government in workforce development.

As the Congressman mentioned earlier, the Michigan Economic Development Corporation recently released a study entitled *Workforce and Career-Development: Building Upon Key Michigan Strengths*. The report is based on a statewide survey of employers, economic developers, educators, Michigan Works Agencies and other local partners along with eight regional forums that were held around the State together; and several relevant studies which were also reviewed to develop our recommendations for action.

Our study found that a skilled worker shortage poses a significant long-term competitive threat to the State. While generating awareness continues to be the primary challenge in attracting workers to technical occupations, low birth rate and the lack of immigration from other States over the past decade has compounded the problem in Michigan.

More potential workers must be attracted and retained in the technical careers, and Michigan's workforce training system needs to respond more accurately and quickly to the needs of the business community in preparing individuals for these positions.

There are a number of new training initiatives that help upgrade less skilled workers and provide new pathways for individuals to learn about and move toward technical skilled careers. New efforts by Michigan Works Agencies, Michigan community colleges, Michi-

gan Department of Career Development, Michigan Virtual University and within the Economic Development Corporation, Economic Development of Job Training Program changes have all helped to improve the technical skills that are now available to thousands of unemployed workers and future workers.

Michigan Technical Education Centers or M-TEC is a new training recourse that is operated through community colleges. These training centers were created by a \$60 million investment through the Michigan Economic Development Corporation with an additional \$30 million investment by private companies and educational agencies locally.

And the reason I wanted to mention this morning is because M-TEC actually provides on-demand training utilizing an open entry and open exit system that can be started at any time without waiting, without lengthy commitments from trainees or employers. So they are designed to serve the needs of its customers. In many cases, they're located in business and industrial works or research and development areas. Again, to meet the needs of the customers.

There are currently 15 out of 18 centers that are open. And in 2001, the center served over 500 employers and 1,600 trainees. And we see this as a way of addressing, through our educational system, the needs that are coming as the educational reform moves through Michigan.

While much has been accomplished, changes remain for our State workforce development system. As indicated earlier, the national data shows that the percentage of workers with associates degrees, certificates or some level of college education has more than doubled from 1973 to 1998. The demand for technical skilled workers with non-baccalaureate training has also risen by roughly 60 percent within the high-tech sector.

Michigan's economy is following this national trend. One of the things, though, that we looked at in our study and reviewing recent research was Ferris State University's Partnership for Career, Decision-Making and Technologies in Health Sciences which conducted one of the most in-depth studies regarding Michigan's students selecting Career Pathways. The study examined how young people choose careers, what factors influence these decisions and whether it's feasible to direct students toward high demand careers.

A series of four statewide surveys were conducted targeting Michigan's young people, parents and educators. A sample size of 400 to 450 was used for each study. And here are some the highlights of those studies: Parents feel two-year degrees and training programs are beneficial for many children, but feel their children have greater potential; three-quarters of the parents think their children need four-year degrees for career success; many parents, and students and most educators feel vocational training programs carry with them a sense of embarrassment; the majority in all three groups say the best jobs require four-year degrees.

Most young people make career decisions based on their personal interest, perceived strength and abilities which is good, but it's not based on the availability of jobs and the level of salary. For example, 32 percent of the young people surveyed say computer careers hold the greatest opportunity, but only six percent intend to pursue

careers in computers. One out of the five teens that said computers offer the greatest career plan on a computer-related career, but not a single respondent who regards engineering as one of the top opportunities plans to be an engineer. The study concluded that we need to improve and expand efforts to enable students and parents to learn about technical careers.

Incumbent worker training is also one of the major challenges that business owners face today. Continuing changes in technology require a constant upgrading in employee skills. And that's one reason why the economic development corporation has been so successful with our economic development job training program.

In 1999, we commissioned a study to conduct a benchmarking in policy and analysis to review that program against others nationwide. And from this study, we found that Michigan employers indicate that training is a tactical strategy to achieve their business opportunity objectives. That training is often required to focus on technical specialty skills, and that the company's customer base requires the type of training that is often necessary. Thus, training programs need to be flexible enough to change quickly to the needs of their customers. From our review and our report, we had three major recommendations that I want to share with you today. One of them was to develop a unified marketing strategy directed toward students and parents. We recommended that the MEDC gather together the local State quaters, including the Michigan Works Agency, Community College Association and the Michigan Department of Career Development to develop a strategic plan for improving a coordination and marketing of technical careers created in the new committee. Each of our systems is doing marketing now, but we believe together that we might be able to address, as a group, the huge issues that still exist regarding the bias against technical careers.

We also recommended that there be a review and better alignment of financial incentives and policies including shifting current resources to ensure that scholarships, grants and loans fully support the training needs of technical careers. We're not aware of a study having been done at that level and we believe this is something that is crucially important.

And thirdly, we believe that we need to build a skilled base credentialing system to ensure the quality and consistency to our customers currently being served throughout the educational system, but particularly the community college level.

As for the role of the Federal Government, you're in a much different position than we are at the State and local level. But we believe that there are certain actions that you might consider at the national level to help facilitate our national efforts. One of those is we recognize the vast array of federal financial incentives and policies regarding loans, scholarships and grants might also be reviewed to determine whether they are supporting the future growth of this country in terms of technical careers.

We also ask that you take a look because of Federal financial resources and helping us develop a more customer friendly labor market information. And by this, I mean, an information where occupational and employment information could be provided at the county level. Currently, this data is only available at the metropoli-

tan level which is much too broad for the areas that we need, particularly in the area of marketing.

We also believe that occupational information should be developed across industries. High-tech occupations are infused throughout many business and industry sectors. Information technologically occupations are a good example of jobs that cut across most industries. And there are hundreds of IT employees in the manufacturing service, governmental and other business sectors, not just in IT companies.

And thirdly, we're recommending that you take a look at occupational information and updating it on an annual basis for those critical employment occupational areas that we determine are necessary for our future economic success. Thank you for inviting me to address today.

[The prepared statement of Ms. Ballard follows:]

PREPARED STATEMENT OF CINDY BALLARD

Thank you for the opportunity to testify before The Environment, Technology and Standards Subcommittee of the U.S. House of Representatives' Committee on Science. The Michigan Economic Development Corporation recently released a study titled *Workforce and Career Development: Building Upon Key Michigan Strengths*. The report is based on a statewide survey of employers, economic developers, educators, MWAs, and other local partners; eight regional forums that were held around the state to gather input; and several relevant studies were also reviewed to develop our recommendations for action. The written testimony discusses the major findings and recommendations of this report.

A basic long-term threat to Michigan's economic competitiveness is a shortage of skilled workers. Low birth rates and a lack of in-migration of workers from other states over the past decade heightens the importance of this issue. A lack of skilled workers will have serious economic development ramifications for Michigan's future economic growth, especially in high-tech sectors such as information technology, manufacturing, and life sciences.

To ensure that the size and skills of Michigan's workforce meet the needs of its business customers, Michigan needs to design and advocate for better systems to connect high school students to business and workers to technical education that will advance people's careers in the new economy.

MAJOR FINDINGS

Background

A skilled worker shortage poses a significant long-term competitive threat to our state. While generating awareness continues to be the primary challenge in attracting workers to technical occupations, low birth rates and a lack of in-migration of workers from other states over the past decade has compounded the problem. More potential workers must be attracted or recruited into technical careers and Michigan's workforce training system needs to respond more accurately and quickly to the needs of the business community in preparing individuals for these positions.

A large and/or growing labor force can sustain economic growth in a state, as companies can draw from a large pool of workers to meet their hiring needs. When the labor force is stagnant or shrinking, however, companies may face higher wages and worker or skills shortages. Nationwide, the young adult population has fallen by 7.6 percent since 1990 and if this trend continues there could be future shortages of workers as this generation ages.

Michigan Population

	1990	2000	% Change 1990-2000
General Population	9,295,297	9,938,444	6.92
15 to 19 years	696,803	719,667	3.28
20 to 24 years	705,318	643,639	-8.74
25 to 34 years	1,574,553	1,362,171	-13.49
35 to 44 years	1,406,149	1,598,373	13.67
45 to 54 years	948,119	1,367,939	44.28
55 and over	1,903,184	2,082,057	9.40

Source: U.S. Census Data

Michigan's total labor force has grown by over 13 percent since 1990. In contrast, Michigan's population aged 25-34 fell by 13 percent during the same decade. Michigan's labor force growth has primarily been driven by the older generations, with over 14 percent growth in 35-44 year-olds and 44 percent growth in 45-54 year-olds. Most of this growth reflects an aging population, with a very small in-migration of about 23,000 people in the 35-44 year old age group over the last ten years (which accounts for about 12 percent of the growth in this age group).

Michigan's declining young adult population reflects the national trend of low birth rates during the late 1960s and 1970s, as well as the national trend of young adults moving to southern and western states. Like most northern industrial states, Michigan lost workers to other states over the last decade. From 1990 through 1999, Michigan experienced a net domestic out-migration of 199,465 people. From 2000-2001 alone, Michigan's net domestic out-migration was 26,995. Although, there was a net domestic out-migration, a recent study, *Attracting & Retaining the Best Talent to Michigan*, shows that Michigan did retain 79 percent of life sciences, information technology and engineering graduates, who have gone on to work in the high-tech jobs. Michigan is doing a good job of retaining university graduates, yet our employers continue to report shortages of skilled workers, who can be trained through on-the-job training, post secondary vocational training, and associate degrees.

High-Tech Workers

Michigan's fastest growing occupations are primarily in the high-tech fields. The definition of high-tech activities is generally limited to industries dealing with information technology, telecommunications, biotechnology, and other related areas. In fact, "high-tech" extends far beyond this narrow definition, as firms and institutions in every industry sector are increasingly applying technology-based products and processes to streamline their operations and increase their competitiveness.

High-tech is not simply a type of product or service produced by an industry, but is a process of innovation and application of research-based and technology-based ideas and processes throughout the economy. Scientists, engineers, computer programmers, software developers, and other high-tech workers employed in all industries to develop and implement innovative, technology-based business processes and applications.

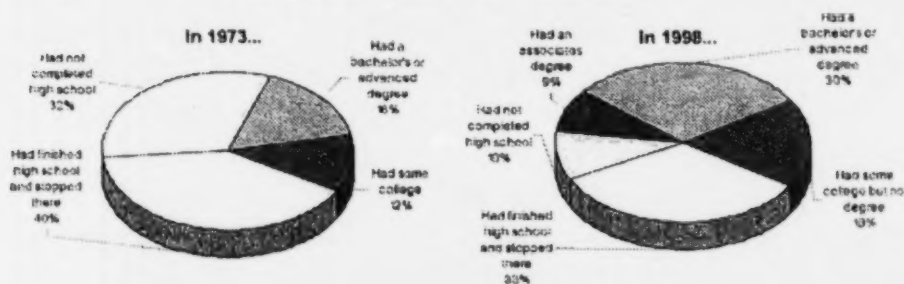
To capture the high-tech activities occurring throughout different industries, high-tech employment based on occupational employment data should be used as a measure, rather than industry-level data. This methodology avoids the bias of a narrowly-defined concept of "high-tech."

In 1998, approximately 242,000 high-tech workers were employed in the state of Michigan, comprising 4.7 percent of the total state workforce. Michigan's level of high-tech activity is quite strong. It stacks up well against major high-tech states like California, Texas, and Illinois, but it has not yet achieved the level of technology intensity of top-ranking states (Maryland, Colorado, and Virginia) where over 6 percent of the state workforce is employed in high-tech occupations.

Data published by Carnevale and Desrochers dramatically underscores this challenge. According to their national research, the percentage of workers (ages 30 to 59) with an associate's degree, certificate, or some level of college has more than doubled from 1973 to 1998. The demand for technically skilled workers with non-baccalaureate training has also risen by roughly 60 percent within the high-tech sector during this period. Michigan's economy is following this national trend.

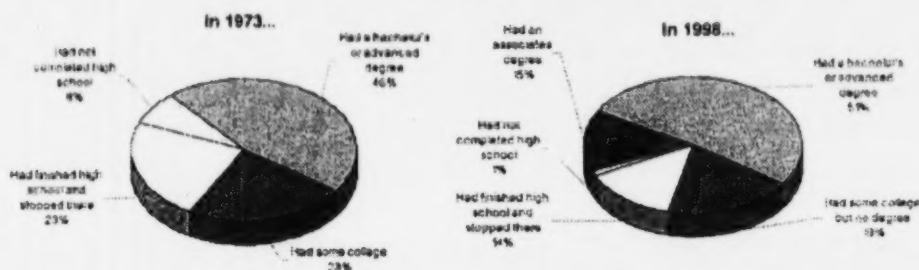
Most Jobs Now Require Educational Attainment Beyond High School

Percentage of prime-age workers in each educational category



Within High-Tech Jobs, Educational Requirements Have Risen Substantially

Percentage of prime-age workers in each educational category



Source: Educational Testing Service, *High-Waged, Credentialing Required: Community Colleges in the Knowledge Economy*.

The good news is that a vast majority of the emerging high-skilled jobs available in Michigan require a level of skill that can be obtained through a series of short-term, concentrated training programs. Occupational data from the MDCD shows that the vast majority of the emerging high-skilled jobs available in Michigan require a level of skill that can be obtained through a series of training courses that may or may not offer credentialing or certification.¹ Employers often have specific skill or knowledge needs which are satisfied by more focused education than that represented by a degree.

Certification and Credentialing: Michigan's Community Colleges Meeting Business Needs

Michigan's business community has noted that continued improvements in the certification and credentialing of these programs are needed to ensure that its employees achieve the necessary skills to perform in the workplace. Certification and credentialing for both credit and non-credit programs are needed.

The National Council for Occupational Education (NCOE) and the National Council for Continuing Education and Training (NCCET) has held two national invitational colloquiums to discuss the impact of trends in certification and credentialing on community colleges. The first colloquium found that adults are more likely to use community colleges to obtain education that will result in long-term employment. Obtaining a traditional associates degree is not a necessity, at best, it may be a long-term goal. These adult students want education and training that will be validated quickly through either a job or advancement. At the same time, employers

¹ "Certification is associated with criterion-referenced performance assessment. It is occupationally focused and documents competency in discrete limited areas, validating the acquisition of skills and providing an assurance of readiness to perform in the workplace. Credentialing is a broader concept. A credential is also more generic and acknowledges the accumulation of certificates through the awarding of a document." *Toward New Models for Credentialing/Certification in Community Colleges*, July 2000

do not automatically assume a degree represents the skills needed to perform on the job. Employers often have specific skill or knowledge needs which are satisfied by more focused education than that represented by a degree. Degrees are far less important than specific knowledge of products and processes.

Surveys by the NCOE/NCCET indicate that community colleges are considered an important training source, but it appears increasingly that companies are turning to other competitors (private training companies or community based organizations) or developing their own training divisions to meet their needs.² A company's competitive advantage may depend on how quickly and effectively it can train its workforce to meet customer demands. Although large corporations may have the ability to direct resources to the development of a training division, it is often done out of necessity rather than economics. For smaller companies, with more limited resources, training must be provided from outside the organization. The demand for training is high; the challenge facing Michigan companies is finding sources to provide the level and quality of training they need, in the timeframe to meet their customer's demands.

The training courses offered by community colleges should be comprehensive and provide some level of certification to indicate that the individual has the skills to perform in the workplace. Participants of the second colloquium reached agreement that to be effective, certification and/or credentialing processes or systems should have the following characteristics:

- Portable
- Modular
- Based on competencies and outcomes
- Recognized by professional and industry associations
- Contain mechanisms for constant updating
- Have mechanisms to acknowledge and accommodate prior learning
- Avoid a guild mentality where narrow vested industry interests dominate
- Recognize the separate functions of instruction and assessment³

In order to ensure the quality and consistency that customer's desire, Michigan's community colleges should build a skilled based credentialing system.

Public Perceptions of High-tech Careers

There have been several studies released recently addressing the educational and training needs of new economy. Ferris State University *Partnership for Career Decision-Making in Technologies and Health Sciences* conducted one of the most recent in-depth studies regarding how Michigan's students select career paths. The study examined how young people choose careers, what factors influence those decisions, and whether it is feasible to direct students toward high-demand careers. A series of four statewide surveys were conducted targeting Michigan young people, parents, and educators. A 400-450 sample size was used for each study.

Some of the conclusions of the study are:

Parents feel two-year degrees and training programs are beneficial for many children, but feel their children have greater potential. Three-quarters of the parents think their children need four-year degrees for career success.

Many parents and students, and most educators, feel vocational training programs carry with them a sense of embarrassment. Majorities in all three groups say the best jobs require four-year degrees.

Most young people make career decisions based on their personal interests, perceived strengths and abilities, not on the availability of jobs or level of salary. For example, 32 percent of young people surveyed said computer careers hold the greatest opportunity, but only six percent intend to pursue careers in computers.

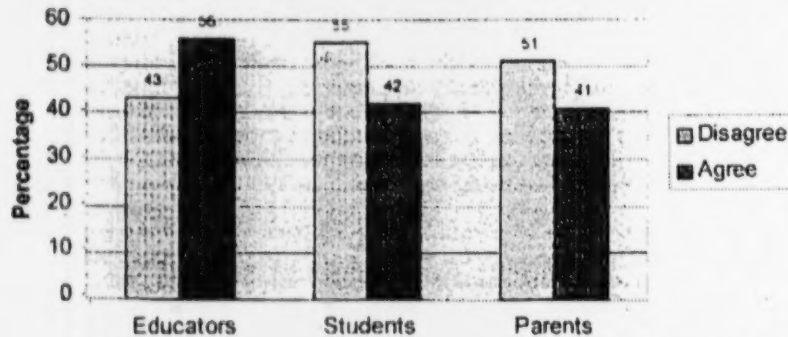
Both parents and students rate themselves above average across eleven employability skills including the ability to work in teams, dependability, and written and oral communication.

One out of five teens that said computers offer the greatest career opportunity plan on a computer-related career, and not a single respondent who regards engineering as one of the top opportunities, plans to be an engineer.

² *Toward New Models for Credentialing/Certification in Community Colleges*, September 2000

³ *White Paper on Credentialing, Certification and Community Colleges*, June 2001

Stigma Attached: Michigan educators, parents and students likely to believe training programs are viewed negatively



Source: Ferris State University

The study recommended that:

1. The state and employers must launch a comprehensive image campaign to promote key career fields and high-demand jobs.
2. Higher education, employers, and the state must be willing to accept the public's perception of the value of a traditional four-year degree over other educational programs and must find ways to work with that perception.
3. Educators and policy-makers must work to improve career education and counseling efforts in the K-12 school system, with less emphasis on the traditional high-school tracks—general education, vocational-technical, or college-preparatory—and a stronger focus on career awareness and skills that apply across tracks and careers.
4. Educators and the state must foster relationships with leaders in business and industry to facilitate career-related professional development and educational opportunities.
5. The state must foster collaboration between interested companies, groups, institutions, and families regarding education and career-development issues to better serve all of education's stakeholders.⁴

Michigan Initiatives

Several innovative programs have been developed to address some of Michigan's workforce development issues. Michigan Technical Education CentersSM (M-TECs)SM⁵ are a new training resource operated by community colleges. M-TECs were created by a \$60 million investment from the Michigan Economic Development Corporation. An additional \$30 million invested by private companies and the educational establishment underscores the wide commitment this initiative received from all stakeholders.

The M-TECs provide on-demand training. Utilizing an open entry, open exit system, training can be started at any time without waiting and without lengthy commitments from trainees and/or employers. Each M-TEC is located to serve its customers. In many cases, they are in a business and industrial park or research and development park. All M-TECs are housed in new facilities, offering the most advanced and cost-effective training technologies. Every center is designed to provide a quality learning environment with flexibility to allow for self-paced learning.

The training is based on industry standards. This reflects current certification and qualification requirements of the respective local industries. A team drawn from the local community guides each M-TEC. This advisory board includes local business leaders, educators, government and organized labor representatives. Its task is to

⁴Partnership for Career Decision-Making in Technologies and Health Sciences, Ferris State University, 2000-2001

⁵M-TEC and Michigan Technical Education Center are Service Marks of the Michigan Economic Development Corporation.

ensure that the M-TEC responds effectively to local needs and maintains a high level of quality.

There are currently 15 of the 18 centers open. In 2001, the centers served over 500 employers and 16,000 trainees, totaling over 349,000 training hours.

The Career Pathways program within the MDCD designates six broad groupings of careers that schools may integrate into their curriculum: arts and communications; engineering; industrial technology and construction; health sciences; human services; natural resources and agri-science; and business, marketing and management. Each pathway includes examples of specific careers; level of education required; relevant courses in school; fast-growing occupations; and personal characteristics related to success. This information helps students see how school subjects relate to a specific career. In June 2001, the Berrien County Intermediate School District issued a report on their Career Pathways that concludes the school district has achieved measurable success by implementing comprehensive system wide Career Pathways curricula. The school district has experienced a 521 percent increase in the number of students participating in Career Technical Education. In addition, there has been a 7.7 percent increase in the number of high school graduates attending post-secondary institutions.

The MDCD has established 42 WorkKeys® Centers throughout the state. WorkKeys is a skill assessment system used nationwide. There are eight WorkKeys assessments: Applied Mathematics, Applied Technology, Listening, Locating Information, Observation, Reading for Information, Teamwork and Writing. WorkKeys is utilized by employers to assess worker skills; provides a means for students and workers to document and advance their employability skills; and can be used by educators to tailor instructional programs to help students acquire the skills employers need.

The Michigan Council Technical Excellence recently established the Michigan Career Readiness Certificate (MCRC) for students and adult who attain required skill levels on four WorkKeys assessments, math, reading, locating information, and writing. The MCRC is a portable credential that tells potential employers that an individual has achieved acceptable levels in these foundation skills necessary for success in the workplace.

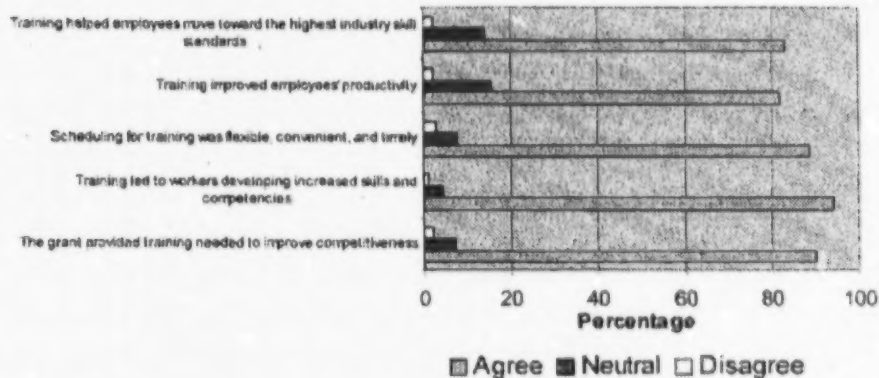
The MDCD granted over \$1.2 million to community colleges and other institutions for the development of competency-based curricula. The grants created an incentive for business and education partnerships to address local training needs. As an example, Oakland Community College used their grant to design a certificate program for PC User Support and Operating System Technicians.

MDCD has utilized a variety of marketing avenues to increase the public's awareness of Michigan's Career Development System. A study commissioned by the department shows a 27 percent increase in awareness from September 2000 to September 2001. The marketing strategy includes the use of billboards, website, toll-free hotline, television and radio advertisement and public service announcements, and more than 100 press releases.

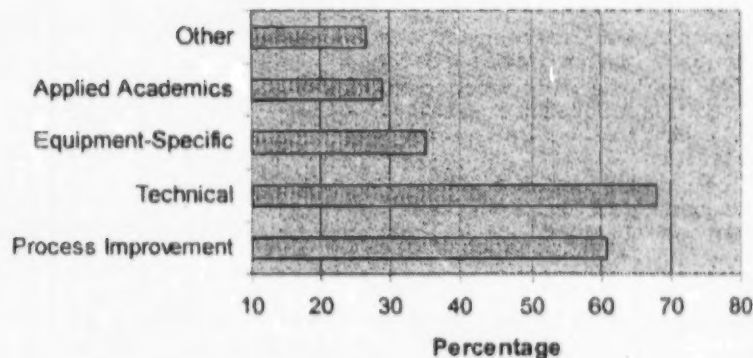
Workforce Training Challenges

Incumbent worker training is one of the biggest challenges business owners face today. Continuing changes in technology requires a constant updating of employee skills. A company's competitive advantage may depend on how quickly and effectively it can train its workforce to meet customer demands.

EDJT - Satisfaction with Training



Type of Training Received



In 1999, the State of Michigan's Economic Development Job Training (EDJT) program commissioned Plante & Moran, LLP to conduct a benchmarking and policy analysis study. The objectives of the study were to:

- Compare Michigan's EDJT program with programs in other states;
- Compare Michigan's EDJT new site location incentive services with similar workforce development incentives in other states; and
- Recommend future customer friendly policies for improving the EDJT program.

Michigan employers interviewed indicated that training is a tactical strategy to achieve their business plan objectives. The training that is often required is focused on technical and specialty skills. A company's customer base needs often dictate the type of training that is necessary. Thus, training programs need to be flexible enough to change quickly to the needs of their customers.⁶ The pace at which technology changes and meeting customer demands makes workforce training a vital component of operating a business in the new economy.

In the same study, surveys indicated that other workforce development programs available through the state were not well known throughout Michigan's business community. Plante & Moran recommend the development of marketing plans for these programs to gain more exposure in the business community.

⁶ Benchmarking and Policy Analysis, October 1999, Plante & Moran, LLP

A number of the Plante & Moran recommendations were implemented and a follow-up satisfaction study was conducted in early 2001. The survey found that employers were very satisfied with the training they received through the program and believed the training not only increased the skills and competencies of their workers, but also their productivity. The types of training received through the EDJT program were primarily in the areas of technical and specialty skills.

Recommendations From The Report

There are more sophisticated tools than ever to connect young people and incumbent workers with the growing technical careers. However, to improve Michigan's workforce development systems the following actions are the recommendations made in the *Workforce and Career Development: Building Upon Key Michigan Strengths* report:

1. Develop a unified marketing strategy, directed towards students and their parents.

The MEDC should gather stakeholders, including the MWAs, Michigan Community College Association, and the MDCD, together to develop a strategic plan for improving the coordination and marketing of technical careers being created in the new economy. The plan needs to address:

- The need for more technical education at both the community college and university levels;
- New ways to describe technical education given the negative perception of vocational training programs;
- More creative thinking about how to pursue a technically oriented career (2 + 2 programs as an example);
- Students making career choices on their perceptions rather than actual labor market conditions;
- The perception of parents and students that the student possess a high level of employability skills; and
- Ways to work with the perception that the value of a traditional four-year general educational degree is greater than technical careers.

2. Review and better align financial incentives and policies, including shifting current resources, to ensure that scholarships, grants, and loans fully support the training needs of technical careers.

The MEDC should commission a study that reviews the state's current financial incentives and policies that support technical careers and make recommendations to ensure that all available resources support the training needs of technical careers.

3. Build a skill based credentialing system to ensure quality and consistency to customers currently being served in the community college system.

The Michigan Community College Association should develop, in coordination with the MDCD and MEDC, a model for statewide recognized credentialing system based on the input from private and public sector representatives that address the needs of its customers (employers and students).

Possible Role for Federal Government

The role of the Federal Government is much different from a State or local one, however there are certain actions that could be taken at the national level to facilitate state and local efforts.

1. A review of federal financial incentives and policies, including shifting current resources, to ensure that scholarships, grants, and loans fully support the training needs of technical careers.

The shortage of skilled workers is not limited to just Michigan. It is an issue facing all employers across the Nation. Technical advances are taking place daily in every business sector. The ability to train the workforce quickly to meet the needs of employers is a key component to a healthy economy.

Most scholarships and loans available for education are federally funded. To build on Michigan's effort to align financial incentives and policies with the training needs of technical careers, there should be a review on the federal level of the scholarship and loan system to ascertain whether it is meeting the training needs of today's economy.

2. Develop a more customer friendly labor market information system.

The Ferris State University study makes it very clear that students and parents have misperceptions regarding the skill needs of today's economy. A way to combat these misperceptions is to have available current, up to date, customer friendly information about the new economy and the changing nature of the labor force. Students and parents are interested in information that is local rather than global. MEDC experiences with businesses also indicate that the labor market information system must evolve to meet current market needs.

It is recommended that:

a. Occupational and Employment information be provided at a county level.

Currently this data is only available at a metropolitan level. We routinely receive requests for county information from businesses looking at a specific Michigan location or locations.

b. Occupational information across industries.

High-tech occupations are infused across many business and industry sectors. Information Technology (IT) occupations are a good example of jobs that cut across industries. There are hundreds of IT employees in the manufacturing, service, governmental and other business and industry sectors, not just in the IT industry.

The MEDC conducted a study regarding high tech jobs in Michigan's auto industry, *Michigan: The High-Technology Automotive State*. The study concluded that Michigan's high-tech employment figure increases over 450 percent from 96,013 to 530,492, when you include the auto industry. In fact, 15.9 percent of auto employment in Michigan at these companies is in high-tech fields, a rate higher than some other industries traditionally considered high-tech.

c. Update occupational information on an annual basis for critical occupations.

Cindy Ballard

Policy Director,
Strategic Initiatives
Michigan Economic Development Corporation



Current Focus As managing director of business productivity services, Cindy is responsible for customized training program (Economic Development Job Training) and worker recruitment services. She also manages the Michigan Technical Education Centers - a network of 16 world-class training centers operated through Michigan community colleges.

Professional Background Cindy has more than 25 years of experience in a variety of workforce development programs and assignments. Prior to her current position,

Cindy was the director of policy and career preparation for the former Michigan Jobs Commission. In that capacity, she led major education and workforce development efforts such as school-to-work, career preparation and school-to-registered apprenticeship tax credits. She also served as manager to the Governor's Workforce Commission, a 20-member board advising the Governor on workforce development issues.

Education Cindy graduated with honors with a B.A. in sociology from Kalamazoo College. She also received a master's degree in counseling from Michigan State University.

Chairman EHLERS. Thank you very much for your testimony.

I'm going to, without objection, declare a brief recess for purpose of hearing remarks from President Eric Gilbertson.

[Recess.]

Chairman EHLERS. The hearing will resume and the Committee will come to order. One bit of housekeeping, just a moment if there is no objection, all additional opening statements submitted by any other Subcommittee Members who are not here will be added to the record. Without objection, so ordered.

We will now resume the hearing, and I'm pleased to introduce Mr. Clark.

STATEMENT OF TIM N. CLARK, DIRECTOR, CENTER FOR MANUFACTURING IMPROVEMENT, MICHIGAN MANUFACTURING TECHNOLOGY CENTER—N.E., SAGINAW VALLEY STATE UNIVERSITY

Mr. CLARK. Good morning. My name is Tim Clark. I am the Director of the Michigan Manufacturing Technology Center-Northeast Region as well as the Director of the Center for Manufacturing Improvement here at Saginaw Valley State University. I appreciate the opportunity to speak to you about the workforce challenges facing small manufacturers in Michigan and the role of the MMTC in assisting them.

Small manufacturers deal with the workforce skill issue at two points. First, when recruiting new employees and again as an ongoing challenge to keep their workers abreast of skills required for their businesses to remain competitive. Employers need a workforce that is trainable, flexible, able to communicate, work in teams and have problem-solving skills.

Training is required to upgrade skills in the existing workforce. Small companies have two challenges to overcome in acquiring needed training for their workforce: time and money. Time for training comes either at the expense of lost production or must occur on overtime. Added to the cost of time is the out-of-pocket expense to pay the training provider.

The MMTC works to improve the competitiveness of Michigan's more than 15,000 manufacturers who have fewer than 500 employees. Our funding is provided jointly on an equal basis by the Federal Government through NIST's Manufacturing Extension Partnership, the Michigan Economic Development Corporation as our State partner, and the companies served in the form of fees.

The Center for Manufacturing Improvement services the 22-county-northeast Michigan region for the MMTC. There are nearly 1,200 small manufacturers located in this territory.

The primary focus of our work is productivity improvement at both the company and system level. For example, workers are trained through their company as part of wider projects to implement new operating techniques such as lean manufacturing or a formal quality system such as ISO or QS certification.

Our offering is generally complementary to that of other providers such as universities, colleges, M-TECs and Michigan Works. Their efforts are directed at the individual worker where we involve the worker as part of a larger company-wide project. For instance, a worker may be trained in problem-solving techniques to

support continuous improvement activities in both a lean manufacturing environment and a quality system implementation.

The MMTC and the Michigan Economic Development Corporation work as partners in assisting manufacturers. The MEDC provides leads to us of companies needing assistance. In turn, we provide Performance Benchmarking service on a no-charge basis to any small manufacturer in Michigan. Many of our referrals are for this service. This contact often serves as a lead in to deeper involvement with the company.

Michigan Manufacturing Technology Center also refers companies to the MEDC for participation in their Economic Development Job Training grant program. This program provides financial assistance for the company to help pay out-of-pocket training costs, and is particularly helpful to small companies.

The typical assignment will start with some sort of assessment of the company's needs. This could be the use of Performance Benchmarking service, a requested walk through or a specific problem to address. The assessment may be a formal written report or as simple as a conversation with the appropriate company personnel. From the assessment, a recommended course of action is provided along with a project proposal. The proposal may be a recommendation for training, consulting or a combination of both.

Cambron Engineering in Bay City is a good example of how we work. Cambron employs approximately 50 people and provides tooling and machining services to a variety of customers. A portion of the customer base began asking suppliers like Cambron to move toward formal quality systems as a condition of doing business.

Cambron participated in a five-company user group funded by an EDJT grant from the State for the necessary training, and worked one-on-one with our quality consultant to achieve ISO certification. The certification has allowed the company to retain customers now demanding certificated quality systems, as well as to bid on work they were previously not qualified for.

Small manufacturers compete with large companies for the same business and thus have the same workforce skill requirements. The smaller manufacturer has less financial wherewithal to support the ongoing skill investment. The Federal Government can help by continued funding for the NIST-Manufacturing Extension Partnership. Together, these Federal dollars with matching funds from the MEDC allow MMTC to provide more affordable training to small manufacturers' incumbent workforce.

Thank you for inviting me to address the Subcommittee. I hope I've outlined the MMTC and how the MMTC fits into the State's network of workforce training. Thank you.

Chairman EHLERS. Thank you very much.

[The prepared statement of Mr. Clark follows:]

PREPARED STATEMENT OF TIM N. CLARK

Good morning. My name is Tim Clark; I am the Director of the Michigan Manufacturing Technology Center—Northeast Region and Director of the Center for Manufacturing Improvement at Saginaw Valley State University.

I appreciate the opportunity to speak to you about the workforce challenges facing small manufacturers in Michigan and the role of the MMTC in assisting them.

First I would like to speak about the challenge to small manufacturers.

Small manufacturers deal with the workforce technological skill issues at two points: first, when recruiting new employees, and again as an ongoing challenge to

keep their workers abreast of the skills required for the business to remain competitive in an increasingly cut-throat environment. Employers need a workforce that is trainable, flexible, able to communicate and work in teams, and have problem-solving skills.

Training is required to upgrade skills in the existing workforce. Small companies have two major challenges to overcome in acquiring needed training for their workforce, time and money. Time for training comes either at the expense of lost production or must occur on overtime; added to this cost of time is the out of pocket expense to pay the training provider.

How does the Michigan Manufacturing Technology Center Help Small Manufacturers?

The Michigan Manufacturing Technology Center is improving the competitiveness of Michigan's more than 15,000 manufacturers who have fewer than 500 employees. Our funding is provided jointly on an equal basis by the Federal Government through NIST's Manufacturing Extension Partnership, the Michigan Economic Development Corporation as our state partner, and from the companies served in the form of fees.

The Center for Manufacturing Improvement services the 22-county northeast Michigan region for the MMTTC. There are nearly 1,200 small manufacturers located in this territory, representing about 8 percent of Michigan's small manufacturers.

The primary focus of our work is two-fold: productivity improvement at both the company, and system level. For example, workers are trained through their company as part of wider projects to implement new operating techniques such as Lean Manufacturing or a formal quality system such as an ISO or QS certification.

Our offering is generally complementary to that of other providers such as universities, colleges, M-TECs and Michigan Works! Their efforts are directed at the individual worker where we involve the worker as part of a larger company wide project. For instance, a worker will be trained in problem solving techniques to support continuous improvement activities in both a Lean Manufacturing environment and a quality system implementation.

The MMTTC and the Michigan Economic Development Corporation work as partners in assisting manufacturers. The MEDC provides leads to us of companies needing assistance. In turn, we provide Performance Benchmarking service on a no charge basis to any Michigan manufacturers. Many of our referrals are for this service, which often serves as a lead-in to deeper involvement with the company.

MMTTC also refers companies to the MEDC for participation in their Economic Development Job Training grant program. This program provides financial assistance for the company to help pay out-of-pocket training costs, and is particularly helpful to small companies.

The typical assignment will start with some sort of assessment of the company's need. This could be the use of Performance Benchmarking services, a requested walk-through or a specific problem to address. The assessment may be a formal written report or as simple as a conversation with the appropriate company personnel. From the assessment a recommended course of action is provided along with a project proposal. The proposal may be a recommendation for training, consulting or a combination.

Cambron Engineering in Bay City is a good example of how we work. Cambron employs approximately 50 people and provides tooling and machining services to a variety of customers. A portion of the customer base began asking suppliers like Cambron to move to formal quality systems as a condition of doing business. Cambron participated in a five-company user group funded by an EDJT grant for the necessary training and worked one on one with our quality consultant to achieve ISO certification. The certification has allowed the company to retain customers now demanding certificated quality systems, as well as to bid on work they were previously not qualified for.

In conclusion, while small manufacturers compete with larger companies and thus have the same workforce skill requirements, the smaller manufacturer has less financial wherewithal to support the on-going skill investment. The Federal Government can help by continuing funding for the NIST-Manufacturing Extension Partnership. Together, these federal dollars and matching funds from the MEDC allow MMTTC to provide more affordable training to small manufacturers' incumbent workforce with the aim of improving the productivity performance of these companies.

Thank you for inviting me to address the Subcommittee. I hope I have outlined how the MMTTC fits in to the State's network of workforce training providers assisting small manufacturers. I would be happy to answer any questions you may have.

BIOGRAPHY FOR TIM N. CLARK

3015 South Glenway Drive, Bay City, Michigan 48706; Residence: (989) 686-6125;
E-mail: TNCJEC@Home.com

BACKGROUND SUMMARY

Manufacturing and engineering experience in a small business environment/structure as well as two Fortune 500 companies. Demonstrated success includes:

- Strategic Planning
- Plant Management
- Product Development/Solutions
- Project Management
- Customer Satisfaction
- OSHA Compliance
- Productivity Improvement
- Budget Planning
- Proactive Safety Management

CAREER HISTORY

SAGINAW VALLEY STATE UNIVERSITY, University Center, Michigan—2000–Present

Director, Center for Manufacturing Improvement

Program Director, Michigan Manufacturing Technology Center

Responsible for Sales and Consulting and Workforce Development services focusing on manufacturers under 500 Employees.

- Providing Seminars, Workshops and On-site Training
- Secured eight EDJT Grants through the Michigan Economic Development Corporation totaling \$365,000
- Founding Member of Saginaw County Workforce Team established to respond to training needs of local business
- Manage primary MEP funding grant with MMTTC.

MAGLINE, INC., Pinconning, Michigan—1988–2000

Manufacturer of Aluminum Hand Trucks and Dock Equipment

Vice President of Manufacturing and Engineering—1992–2000

Director of Manufacturing and Engineering—1990–1992

Manager of Manufacturing—1988–1990

Plant Manager—1987–1988

Managed 100 employees in two manufacturing facilities including corporate engineering while focusing on customer product initiatives.

- Co-chaired team formalizing new product development process and integrated Market Research, Product Design, Market Testing as well as Product Introduction to improve achievement of sales and profit targets.
- Member of two-person corporate account management team developing designs for route delivery projects increasing customer efficiency and safety.
- Led a team of project engineers in developing 11 new products including line extensions that maintained and improved sales and profits.
- Member of acquisition review team analyzing manufacturing and engineering capabilities and making recommendations to management; six companies reviewed, one company purchased.
- Reduced manufacturing cost by 7 percent through vendor negotiation and initiation of employee action teams.
- Reorganized Manufacturing and Engineering Departments as company streamlined from three business segments to one by reducing salaried staff 7 percent and plant head count by 60 percent.
- Created Kan-Ban System for boat trailer production eliminating stock-outs and improving machine utilization.
- Implemented attendance policy establishing consistency and improving attendance.

- Implemented safety program resulting in annual insurance premium reduction of \$450,000.
- Initiated project to convert manual drawing system to CAD resulting in company's first PC network and four AutoCad stations.

AMERICAN AIR FILTER, Elizabethton, Tennessee—1987
Manufacturer of Industrial Air Filtration Equipment

Manager of Manufacturing

Managed labor standards, cost estimating, tooling and process planning in addition to supervising six engineers and providing services for 125 plant employees.

- Partnered with Purchase Agent to renegotiate vendor terms in response to corporate bankruptcy resulting in uninterrupted material supply.

CHAMPION INDUSTRIES, Winston-Salem, North Carolina—1984–1986
Manufactured Commercial Dishwashers

Manufacturing Manager/Manager of Manufacturing Engineering

Managed two plants with 105 employees including Employee Relations while providing manufacturing engineering and quality support.

- Established Manufacturing Engineering Department improving bills of material, drawing accuracy, redesigning product for manufacturability and cost efficiency resulting in 20 percent direct labor reduction.
- Reorganized shop staffing to allow creation of second shift resulting in elimination of \$30,000/per month of subcontracted fabrication.
- Participated in 3-person negotiating team representing manufacturing resulting in elimination of subcontracting clause and a new 3-year labor agreement.
- Created Specials Department to meet non-standardize requests reducing production disruption and increasing customer service.

KRAMER EXPLORATION COMPANY, Delaware, Ohio—1981–1984
Independent Oil and Gas Producer

Field Engineer

Supervised oil well operation activity including management of field contractors bringing 100+ wells online.

HOBART CORPORATION, Troy, Ohio—1973–1981
World's Largest Manufacturer of Commercial Food Equipment

Manager of Technical Services, International Operations

Coordinated engineering and manufacturing projects for all foreign subsidiaries.

- Developed plant layout for newly expanded Australian facility allowing sheet metal fabrication to be brought in house.
- Designed initial European commercial dishwasher concept adapting U.S. components, increasing design commonality and improving project introduction timing.
- Conducted manufacturing cost study and prototype testing of Brazilian version of European commercial dishwasher design resulting in unit being launched into production.
- Completed job rankings for English factory in preparation for contract negotiations resulting in streamlined pay categories.
- Developed plant layout assisting local engineer in consolidating two UK facilities.

SIDNEY FLYING SERVICE, Sidney, Ohio—1968–1974

Flight Instructor and Manager of Family Fixed-Base Operation

EDUCATION

B.S.—Mechanical Engineering (Co-op Program), Tri State College, Angola, Indiana, 1973

LICENSES/CERTIFICATIONS

Commercial Pilot and Flight Instructor (Single and Multi-Engine Land, Instrument Rated)

Registered Professional Engineer, State of Ohio and Michigan

PROFESSIONAL DEVELOPMENT*Company Sponsored:*

Microsoft Word and Excel Courses, 1999

Developing Your Strategy for Sales and Marketing, John Monokay, 1997

Kotler Marketing Seminar, AMA, 1996

The Management Course, AMA, 1995

Statistical Process Control, Saginaw Valley Manufacturers Association, 1991

Interaction Management, DDI, 1989

Financial Management for Non-Financial Managers, AMA, 1988



MMTC - NORTHEAST / 7400 BAY ROAD / UNIVERSITY CENTER, MI 48710 / PHONE: (517) 790-4047 / FAX: (517) 790-4083 / www.cmi-mmtc.com

24 July 2002

The Honorable Vernon Ehlers, Chairman
House Science Subcommittee on Environment, Technology & Standards
Committee on Science
US House of Representatives
Washington, D.C. 20515

Dear Chairman Ehlers:

Pursuant to the Rules of the House of Representatives, I am submitting this letter of financial disclosure. I testified before your Committee at the field hearing held on 24 June 2002 at Saginaw Valley State University (SVSU) in University Center, Michigan.

The Center for Manufacturing Improvement at SVSU is a Regional Office for the Michigan Manufacturing Technology Center (MMTC), the U.S. Department of Commerce, National Institute of Standards and Technology, Manufacturing Extension Partnership (MEP) organization in Michigan. Under the terms of a Cooperative Agreement with NIST-MEP [70NANB5H0059], MMTC received \$2.25 million per year in Federal funding in FY2002, FY2001, and FY2000.

As an MMTC Regional Office, our Federal funding for the past three fiscal years is as follows:

- FY2002 - \$95,250
- FY2001 - \$84,044
- FY2000 - \$75,197

Please feel free to contact me at 989-964-4047 should you require any additional information.

Sincerely,

Tim N. Clark, Director
Center for Manufacturing Improvement / MMTC-NE

lsh



Chairman EHLERS. Mr. Worthington?

**STATEMENT OF ROBERT C. WORTHINGTON, SR., PRESIDENT,
GLOBE FIRE SPRINKLER CORPORATION**

Mr. WORTHINGTON. Chairman Ehlers, Congressman Barcia, distinguished witnesses, ladies and gentlemen. I do have to clarify one thing that Jim said about me, and I do appreciate all of his nice comments, but how can I have been in the business 50 years when I'm only 39 years old? It doesn't change. The comments I'd like to make this morning are based upon our experience in Standish, Michigan. And interestingly, parallel comments made by others throughout the country.

There is no question that America is faced with a critical shortage of skilled labor for the manufacturing environment. It appears that the experiences we have found to be true of Globe Fire Sprinkler Corporation are common to the entire United States. To supplement the few comments I shall make today, I am attaching to the written copies or printed copies of my report, copies of excerpts of a talk given by Mr. Jerry Jasinowski, President of the National Manufacturer Association, at a Workforce Development Conference in Tennessee recently. This report parallels to a surprising level the experience of my company in Standish, Michigan.

Globe's experience in locating and hiring employees with the appropriate technical skills for its business is usually dependent upon the business and economic climate at the time. Generally, in a good economy, it is naturally harder to find any employees with the needed skills. Conversely, when times are bad, skilled workers are more readily available.

We have found that the State of Michigan is doing a far better job today in trying to locate jobs and positions for those seeking work with technical and also nontechnical skills. We have been rather successful within the past two years finding skilled employees through the local Michigan State job centers.

Our assessment of the technical skills workers possess when they enter the workforce for the first time is that their basic reading, writing and math skills are not close to the level required for even basic jobs, even though most of these individuals have a high school education and a diploma.

Generally speaking, to enter to the workforce for the first time without some prior training is very difficult. Most jobs in our area do not require people of great skills, but do require the basic skills that should be taught in the school system. Those who are currently in the workforce generally have more skills, are better trained and are more mature for the job requirements.

Some of the consequences small and medium-sized manufacturers face, if employees do not continue to upgrade their knowledge of technical skills, will result in America eventually to find itself to be a second-class industrial nation and we could easily be out-classed by other nations.

It is also possible that States other than Michigan could become more appealing to manufacturing companies if Michigan does not continue to develop and update technical skills for its workforce. Some of the obstacles both workers and manufacturers face when trying to upgrade skills are the technical training facilities not

being close by their homes or work locations, and also affordable tuition.

Manufacturers face a potential loss of business income because work can be lost to other States or countries if worker basic skills are not upgraded.

It would be my recommendation in order to improve the technical ability of our workforce is that basic reading, writing and math skills be stressed by all educational facilities beginning at the elementary level. All students today need more basic skills and a program where possibly high school students to work in a manufacturing plant to learn what skills they would require before graduating from high school could be quite beneficial. Companies should work with all technical schools, colleges and universities to assist in the planning of good choices for the preparation of technical education and training classes.

This criteria should be reviewed no less than every two years to ensure that it does not become outdated. More and more machines are of the C.N.C. (Computerized numeric control type) and these are programmed by computer. In order to accomplish this, good computer and mathematical skills are required.

Also in a manufacturing environment, verbal and written communication skills are necessary to be successful.

Assistance for small and medium-sized companies with tax credits for helping to train workers would be most helpful. The providing of close-by classes for computer and other training would also be of great assistance.

It is my considered opinion that basic reading, writing and math skills are not adequately taught to school students, as we have found that many basic spelling, math and grammar errors are made by job applicants from many different areas and educational districts. To improve these three primary areas, improvement needs to begin in the grade school, so that it carries over to high school, and college and thence to the workplace.

For your interest, I attached to my talk a copy of an article written by George Weimer, the Contributing Editor of *Manufacturing Management Magazine*. It suggests the use of NCMS/e-learning systems be utilized. It's not something that I am familiar with, but you might enjoy reading his article.

Also attached is a copy of an article written by Mr. Tom Grasson, the Editor of the *American Machinist Magazine* entitled "Manufacturing's Future Depends on the Interest of Today's Youth." Both of these articles provide very interesting reading on the subject matter. Thank you very much for your time.

Chairman EHLERS. Thank you, Mr. Worthington.

[The prepared statement of Mr. Worthington follows:]

PREPARED STATEMENT OF ROBERT C. WORTHINGTON

There is no question that America is faced with a critical shortage of skilled labor for the manufacturing environment. It appears that the experiences we have found to be true of Globe Fire Sprinkler Corp. are common to the entire United States. To supplement the few comments I shall make today, I am attaching a copy of excerpts of a talk given by Mr. Jerry Jasinowski, President of the National Manufacturer Association, at a Workforce Development Conference in Tennessee recently. This report parallels to a surprising level the experience of my company in Standish, Michigan.

Globe's experience in locating and hiring employees with the appropriate technical skills for its business is usually dependent upon the business and economical climate at the time. Generally, in a good economy, it is naturally harder to find any employees with the needed skills. Conversely when times are bad, skilled workers are more readily available. We have found that the State of Michigan is doing a far better job today in trying to locate jobs and positions for those seeking work with technical and also non-technical skills. We have been rather successful within the past two years finding skilled employees through the local State of Michigan job centers.

[Our assessment of the technical skills workers possess when they enter the workforce for the first time, is that their basic reading, writing, and math skills are not close to the level required for even basic jobs, even though most of these individuals have a high school education and diploma.] Generally speaking, to enter the workforce for the first time without some prior training is very difficult. Most jobs in our area do not require people of great skills, but do require the basic skills that should be taught in the school system. Those who are currently in the workforce generally have more skills, are better trained, and are more mature for the job requirements.

Some of the consequences small and medium sized manufacturers face, if employees do not continue to upgrade their knowledge of technical skills, will result in America eventually to find itself to be a second-class industrial nation and could easily be out-classed by other nations. It is also possible that states other than Michigan could become more appealing to manufacturing companies if Michigan does not continue to develop and update technical skills for its workforce. Some of the obstacles both workers and manufacturers face when trying to upgrade skills are the technical training facilities not being close to their homes or work locations, and also affordable tuition.

Manufacturers face a potential loss of business income because work can be lost to other states or countries if worker basic skills are not upgraded.

It would be my recommendation in order to improve the technical ability of our workforce is that basic reading, writing, and math skills be stressed by all educational facilities beginning with the elementary grades. All students today need more basic skills and a program where possibly high school students could work in a manufacturing plant to learn what skills they would require before graduating from high school could be very beneficial. Companies should work with all technical schools, colleges and universities to assist in the planning of good choices for the preparation of technical education and training classes.

This criteria should be reviewed no less than every 2 years to ensure it does not become outdated. More and more machines are of the C.N.C. (computerized numeric control type) and these are programmed by computer. In order to accomplish this, good computer and mathematical skills are required. Also in a manufacturing environment, verbal and written communication skills are necessary to be successful.

Assistance for small and medium-size companies with tax credits for helping to train workers would be most helpful. The providing of close-by classes for computer and other training would also be a great assistance.

It is my considered opinion that basic reading, writing, and math skills are not adequately taught to school students, as we have found that many basic spelling, math, and grammar errors are made by job applicants from many different areas and educational districts. To improve these three primary areas, improvement needs to begin in grade school so that it carries over to high school and college and thence to the workplace.

For your interest, I am also attaching a copy of an article written by George Weimer, Contributing Editor of the *Manufacturing Management Magazine*. It suggests the use of NCMS/e-learning systems be utilized.

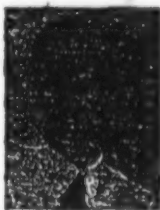
Also attached is a copy of an article written by Mr. Tom Grasson, Editor of the *American Machinist Magazine* entitled "Manufacturing's Future Depends on the Interest of Today's Youth." Both of these articles provide interesting reading on the subject matter.

Shortage of skills

NAM chief says workforce issue nearing 'critical' stage

America is facing a critical shortage of skilled labor that demands creation of a new career path to channel bright and ambitious students into industry and manufacturing, National Association of Manufacturers president Jerry Jasinowski said recently.

Speaking at a workforce development conference in Tennessee, Jasinowski said a survey of more than 6,000 NAM members found 80 percent of them were having trouble finding qualified workers.



Jasinowski

"The shortage is most evident among production and skilled craft employees — the very heart of manufacturing," Jasinowski said. "For every five skilled machine tool operators now on the line, we have only one trainee in the pipeline. A majority of these and other highly skilled workers are nearing retirement. When they begin to leave the workforce, our skills shortage will become critical."

Jasinowski said that changing technology and more intense global competition were creating unprecedented demand for highly skilled labor.

"The notion of blue-collar labor is obsolete," he said. "Workers today no longer run the machines of industry; they monitor and program the computers that run the machines. We have entered the no-collar generation. A few highly skilled employees are responsible for major industrial operations involving highly complex 'Star Wars' environments. The jobs they do are sophisticated and challenging. They earn excellent pay."

However, Jasinowski said the nation's schools were not producing the high-quality labor that modern industry and manufacturing needs.

"Too many graduates of our K-12 educational systems do not emerge qualified to handle entry-level jobs in a skilled industrial setting," he said. "They lack basic reading, writing and math skills. They lack problem-solving and teamwork skills. Most businesses must invest substantial time and money preparing these entry-level workers for rudimentary responsibility. Businesses believe this is the job of the schools, and they are right."

"There is too much emphasis on four-year college educations," he continued. "We are conveying the false impression that the four-year college curriculum is for everyone. We are sending more than three-fourths of high school graduates to college and only about one-fourth of them will graduate. This is a terrible mistake that wastes vast resources and does extensive damage to many of our finest young people."

Jasinowski called for a new career path based upon a carefully crafted technical certification program to qualify young people for productive careers in industry.

"We have to change the way people think about alternative careers," he said. "Our brightest young people with a sense of adventure are needed in the critical work of creating the products that enhance the quality of life and make our economy strong."

The NAM chief challenged firms to work with public schools and workforce boards to forge a new ethic for education and training.

"This is an education and cultural issue, but it is foremost an economic issue," he said. ▲

Manufacturing Is a Job for Knowledge Workers

Today's production worker is much more of a brainworker than his great-grandfather. That's why, to stay competitive and profitable, today's industry needs to continually educate workers as well as machinery and systems.

It's no surprise then to find that manufacturing has been trying to automate learning along with production. The new dream in industry is to automatically keep everybody up-to-date on engineering and factory techniques. But how?

The old reliables of academia have been tried: instructors, classrooms and tests. The result has been some success, but at a terrific cost. In effect, companies have had to hire whole staffs of educators.

Today, however, researchers have been using computers and software systems and, of course, the Internet. Results have — until now — been spotty. Big mistakes were made. Now, however, the National Center for Manufacturing Science (NCMS), Ann Arbor, Michigan, claims it has made significant progress in bringing cost-effective continuing education to industry — using industry's resident expertise.

The approach it uses involves reusable training modules that can be updated. "These are multimedia, interactive, 20- to 30-minute modules that allow all classes of any company — anywhere in the world — to view and participate," NCMS's Knowledge Solutions Division general manager Ken Johnson explains to *M/EM*.

Manufacturing is complex work, including the cooperative efforts of numerous companies and thousands of experts from top managers to machinists and maintenance people. Coordinating their continuing education is an ever-more difficult competitive challenge. Keeping the whole effort focused on the specific and special needs of any given area of expertise is one primary goal of any e-learning system. The NCMS Knowledge Solutions Division program uses a company's own experts to teach others over the Internet. "It's like a flexible manufac-

turing system. Call it a flexible knowledge system," says Johnson.

Previous approaches to e-learning were not specific enough and were far too expensive. Using a series of "learning portals," the SME approach allows a company to bring specific material to any given class while updating the database itself. Only the Internet can allow NCMS to do this cost-effectively.

"Total continuing education programs have cut costs from \$100,000 per class to \$4,500," Johnson says. Forty classes per month, e-style, cost less than two regular classes. Also, e-style classes are reusable and updatable in training modules in the SME system.

Previous attempts to do this sort of thing were "too generic, too expensive, and were not kept current," adds Johnson. How successful has the NCMS effort been? "Two of the Big Three are using our e-learning systems. The third is negotiating." He also notes that one automaker's entire, worldwide logistics and material handling operation is using this e-learning technique developed by NCMS.

Automation was often misunderstood as some horrible weapon to get rid of workers. A lot of time and effort was used up in a generations-long fight between management and labor over exactly what that word meant. It has come to mean a better life for all through increased productivity. Let's hope that continuing education through e-learning brings about even greater productivity for all.

For further information on the NCMS e-learning systems, go to NCMS.org. The new Web site for its Knowledge Solutions Div. SME system should be ready by now.

George Weimer

George Weimer, consulting editor, weimer@edison.com



BEST COPY AVAILABLE

editorial

Manufacturing's future depends on the interest of today's youth

If the future of American manufacturing is in the hands of our young people, we could be in serious trouble. Now I'm not implying that our children are not bright, intelligent, and energetic people. I'm suggesting that today's youth have no interest in manufacturing because as parents, educators, and industry leaders, we are doing little to promote the importance of manufacturing and the many career paths available within the industry.

According to a recent survey conducted by Ferris State University Career Institute for Education and Workforce Development and co-sponsored by the Precision Metalforming Association Educational Foundation, the National Association of Manufacturers (NAM) Center for Workforce Success, and the Associated Equipment Distributors Foundation, most teenagers are not receiving career guidance outside the home and are not pursuing the appropriate educational plan for real-world career opportunities and business needs.

More than half of the 800 high school juniors and seniors surveyed nationwide could not identify someone in high school who has mentored or been especially helpful in advising them on career or job options. And, while this is a scary statistic, it should not come as a surprise, according to Phyllis Eisen, vice president of the Manufacturing Institute, the education and research arm of NAM. "With an average of only one career guidance counselor for every 500 high school students nationwide, today's teens are getting little career counseling about the real world," cites Eisen.

With this 500:1 ratio, guidance counselors can't be effective in presenting attractive career options in place of a four-year degree. First of all, I'm not sure how many of these counselors have firsthand knowledge or experience in either manufacturing or the skilled trades. Maybe that's why 41% of the students surveyed attribute a sense of embarrassment to vocational education training programs and 45% said pursuing technical training might limit their career options.

I also think parents are partly to blame for this situation. We all want to see our children succeed. But we also must come to realize that there are more ways to measure success than obtaining a college degree.

So I applaud NAM and the U.S. Department of Commerce for launching GetTech, www.GetTech.org, a multimedia educational campaign and website that informs middle school students about available high-tech careers if they study math and science. I also applaud the sponsoring groups of the survey that intend to broadly distribute the study to educators, parents, and employers to start a national dialogue about the need to beef up our career-guidance system.

It's about time manufacturing gets recognized as a dignified career path. And we can help make it happen by supporting NAM and the other groups working diligently to make our children aware of the many career options within manufacturing.

AM

Tom Grasson
Editor

tgrasson@penton.com

BIOGRAPHY FOR ROBERT C. WORTHINGTON

Robert C. Worthington is the CEO and President of the Globe Fire Sprinkler Corporation located in Standish, Michigan. He has been in the Fire Sprinkler Industry for almost half a century, 35 years of which were associated with other sprinkler manufacturers, with 14 years at the helm of Globe's manufacturing.

Bob has an Engineering Certificate from the University of Rhode Island and is a registered P.E. in Fire Protection in the State of California. He was formerly on the National Fire Sprinkler Association's Board of Directors and Manufacturer's Council for many years. He has served on numerous National Fire Protection Association Technical Committees, in addition to many years service on the National Fire Sprinkler Association Engineering and Standard's Committee, as well as the American Fire Sprinkler Association Technical Advisory Committee. Additionally, he has lectured on life safety internationally and provided training in the use of the first mini-computers for pipeline hydraulics and grid systems in Europe and the U.S.A.

In 1997 he was presented with the National Fire Sprinkler Association prestigious Golden Sprinkler Award. Only a select few in his profession have received this, the Sprinkler Industries highest award. This event was entered into the Congressional Record on November 13, 1997.



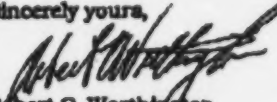
August 8, 2002

Honorable Vernon Ehlers
 Chairman of the Sub-Committee on
 Environmental Technology and Standards
 Committee on Science
 Suite 2320
 Rayburn House Office Bldg.
 Washington, D.C. 20515-6301

Dear Congressman Ehlers:

With reference to the testimony I gave before your Sub-Committee on June 24, 2002, concerning "Workforce Training in a Time of Technical Change", I wish to advise that I have received no funding during the current fiscal year, or either of the two (2) preceding fiscal years, pertaining to the subject matter on which I gave testimony.

Sincerely yours,


 Robert C. Worthington
 President

4377 Air Park Drive • Grandtish, Michigan 48858



(889) 848-4523 • Fax: (889) 848-0790
 Inside USA • 1-800-248-0278 • Fax 1-800-848-8211

DISCUSSION

Chairman EHLERS. We will now begin the questioning period. And I have a number of questions.

EFFORTS AT ENCOURAGING WOMEN AND MINORITIES TO
STUDY MATH AND SCIENCE

First of all, Ms. Ballard, you referred to some of the problems, the shortage of manpower in the area of people who are technically trained or at least have some technical background of the type of Mr. Worthington referred to.

You're probably well aware in this country we essentially throw away half of our potential workforce because for some strange reason it's the culture in our country among women that they should not study mathematics and science and should not enter those professions. This also is a problem by minorities, though, probably not as great as it is with women.

What is the State doing to try to turn that around, to try to encourage more women and minorities to study math and the sciences, particularly in the elementary and secondary grades? And presumably from there, follow that to pursue that also in higher education?

Ms. BALLARD. There are a couple of initiatives that come to mind. One of them is Career Pathways. In Michigan, through State appropriation and established through career preparation system, to allow funding to go to K-12 districts to help establish Career Pathways starting in the elementary school and moving through middle and high school, to allow individuals to understand in the broad sense what kinds of careers are available and to provide opportunities for them to see a connection between what they're learning in the classroom and the real world.

This becomes most critical, though, when you move into middle school and then into high school because that's at the point in time when the individual will very frequently fall against the wayside in terms of taking some of those hard classes or determining what they want to do. And a lot of schools in a K-12 system, with the help of their post secondary partners, engage in things such as manufacturing, summer camps, robotics competitions.

Lots of efforts that are going on to be able to indicate to individuals that these are not only viable careers, but they're fun things to do and that there is something that is available. And some of these camps actually reach out to females and minorities to try to engage them and bring them in a comfortable atmosphere to help work on it. But what you identified is a huge problem.

Chairman EHLERS. I experienced this personally when our oldest daughter, who had gotten A's all the way through the first eight grades in math, reached high school algebra. The first test was an "A," the second was a "B+," the third was even lower. We had a little talk, and she said, you know, girls can't get math. She had picked that up in high school. She didn't have that the first eight years. We had a little talk and then she had As again, and then went on to take calculus in college. She still majored in english, which is fine with me, but at least she had a background that has

helped her in virtually every job that she has had, a background in both math and science.

Let me ask you another thing. How closely do you work or interact with the State Department of Education on these problems, and what are they trying to do as a result of your work with them to improve math and science statewide in the K-12 system?

Ms. BALLARD. Our strong partner in this is the Michigan Department of Career Development which was established particularly to take a look at this whole area. The Michigan Department of Education is also a partner in terms of establishing curriculum related to MEAP, Michigan Educational Assessment Program, in the State to identify certain basic standards in individuals who would have a certain grade level so that we can assure that when someone graduates, unlike the testimony here today, that that diploma really does mean a certain credential that is translatable out in the marketplace.

So we work on this in a number of ways with those two partners. But we also have a lot of other partners through the post secondary system and also through Michigan Works Agencies. Because, again, this is a very broad system that reaches across all kinds of strata, and really takes a combined effort to try to make sure that even individuals that are dropping out of school have information and have opportunities either before they move or once they're out in the labor force.

Chairman EHLERS. And who coordinates all this and is this working?

Ms. BALLARD. It is a cooperative effort. I don't think there is any one person in terms of coordinating it, but we have a number of counsels and groups. At the State level, there is the workforce investment counsel who oversees overall workforce development. But we have very, very strong partnerships with all stakeholder groups, which is one of the reasons why I think both of you mentioned earlier we have such a good workforce development system in the State is because of its local partnership working so well.

Chairman EHLERS. All right. Thank you. I thought it was also because of Governor Engler.

Ms. BALLARD. He certainly has helped to identify a number of structural changes to promote the systems and initiatives such as M-TEC are the result of the Governor.

Chairman EHLERS. Thank you. It's been interesting. I threw his name in simply because of an interesting watch from a distance how he has literally turned this State around in the whole areas of the workforce training and attracting manufacturing.

Mr. Worthington, I appreciate your testimony. You said several times there are basic problems that you've encountered with hiring new employees in terms of their math, reading, science and technical skills. And you also said toward the end that this seems to be basic to all school systems because you find it in other areas as well.

That's what I've been spending a lot of time on in the last few years, and I appreciate your insights. That sort of thing encourages me to work even harder on this, but it is absolutely astounding. I remember when I was in the State legislature hearing from a gentleman who ran this string of convenient stores in Lansing. He was

losing \$100,000 in year in wrong change, simply because if you give a customer too much change, they tend to take it. If you don't give them enough, they let you know. So it's a one-way street, money going out.

He adopted a very simple 10-question math test, extremely simple—addition, subtraction and so forth—and screened his applicants that way. His losses went down to \$5,000 a year. It's simply that his students had never learned—or the people applying had never learned simple addition and subtraction. And that indicates as you pointed out, we have a lot of work to do here. I appreciate your insight on that. My time has expired and I'll turn to my colleague, Mr. Barcia.

WORKER TRAINING PROGRAMS: AN EMPLOYER'S PERSPECTIVE

Mr. BARCIA. Thank you. I also have a question for Mr. Worthington. You had firsthand experience with worker training programs and the skill levels of people working for manufacturing jobs which you alluded to in your testimony to the Subcommittee.

From your vantage point, Bob, what types of worker training programs in your view work best? For example, those that are done at the company (an employer sponsored training or retraining remedial-type of education to upgrade the skills that your specific company needs) or do you think courses at local community colleges or certification courses that might be designed for specific manufacturing employee base program?

There has also been a lot of emphasis on distance learning or education through the internet. How effective would you think this type of the electronic education would be for most employees? And the employees that work at Globe, most of them, are they computer literate? Do they have computers in their home or at their work stations where they can access that type of interaction and dialogue in terms of enhancing their educational attributes?

Mr. WORTHINGTON. Jim, I think that's an excellent question and there are many facets to the answer. About 75 percent of the workforce of the graduates of high school today are going into a college or university. Only about 25 percent of them have finished. And I think that part of the reason is that they really don't know what they want to do. Not everybody has the intellect or the ability to get through four years of college. And unfortunately, people view the manufacturing era as a blue collar-type job, and it really isn't that anymore.

I think that if a remedy could be, as I alluded to in my testimony, that the school, high school people be given some exposure, be given more guidance to know what it's like to work in areas other than going to a university and getting a part of the American dream.

We've had machinists who come to us with a certificate from a local college that you would expect would know how to run the machines and so forth. And we have found that—I remember one fellow in particular we hired. He had the degree, and he ruined more expensive material than you can shake a stick at. And number one, he couldn't read a blueprint. He couldn't understand the mathe-

matics. He couldn't meet the tolerance of running the machine that we had.

I think that before someone is given a diploma or certificate, that they've got to really perform a hands-on type test without anybody helping them. And I think, gee, he's a nice guy. I'm going to give him a good mark. We'll get him through. But it doesn't help him in the workplace. Because I remember one place we just let him go.

We find that the young people today don't want to be machinists or work in a manufacturing workplace with that respect. It actually is a fairly good high paying job. We're lucky that the automobile industry has layoffs on occasion and we're able to get good machinists from these groups because they're just not really available on the street. They're just not. I hope I've answered your question to some degree.

Mr. BARCIA. Next, I'd like Mr. Clark to respond. I want to mention that a few weeks ago, we had a fellow who owns a state-of-the-art steel manufacturing company, Acra Cast out in Bay City, join us at a press conference with representatives and myself, and with a few other Members of the Congress who have been champions of the Manufacturing Extension Partnership. And Mr. Clark, you alluded to that in its value to small and medium-sized companies and businesses throughout Michigan and the country.

We are fighting to maintain an adequate level of funding and actually increase the level of funding to provide that technical expertise for our small and medium-sized manufacturers that don't really have the resources to hire some of these highly trained professionals on a full-time basis because they have special project needs on a timely basis, and they lack resources to do that.

THE GREATEST CHALLENGES FACING MICHIGAN'S SMALL AND MEDIUM-SIZED MANUFACTURERS

But my question is the MMTC works closely with small and medium-sized manufacturers throughout the northeast region. What do you see as the biggest challenges facing Michigan manufacturers? Would you rank workforce technical skills in relationship to Bob's previous testimony and his comments a moment ago, or would you rank workforce technical skills and manufacturers' ability to stay competitive and profitable?

Mr. CLARK. I would think it's one of the top categories for the small business because, particularly in the end of it, we're working with lean manufacturing or formal quality system. These are all tools to put in place a dynamic with a company of continuous improvement where perhaps last year they improved their cost picture by 10 percent. It doesn't mean that they're done. It means that each year, they'll have a goal that they need to achieve to stay competitive. Because we used to say that you either move forward or move backward. Because if you're standing still, competitors are passing you by so you're moving backwards.

So the ongoing investment and the skills to stay competitive certainly is a top priority for a small company. Just because if they don't stay up with what's currently available and other people have an advantage that they don't have, and certainly the workforce fits into that picture.

Mr. BARCIA. Thank you very much. Later, if there is time, I have a question for the other two witnesses.

CURRENT WORKER TRAINING PROGRAMS AND THE ROLE OF THE FEDERAL GOVERNMENT

Chairman EHLERS. Next, Mr. Mehlman. You're fairly new in this job and you have a very important job. You have heard some of the testimony here about what needs to be done. You're, of course, involved with various programs that already exist. I'm interested in any comments you might have about the programs that already exist and how well they're performing and how they could be improved.

But also any new ideas you have had that you might be introducing as to how best the Federal Government can work with the State and with the business community and the educational community to solve some of the problems that Mr. Worthington talked about. I would appreciate it if you would just give us some thoughts on that.

Mr. MEHLMAN. Certainly through doing the report over the last year, we have heard about a lot of exciting efforts that are under way, and it's fair to say that models will continue to evolve as we all recognize the workforce challenge to be perhaps paramount for maintaining American innovation and competitiveness.

Some of the things that I've seen that I—and this is a little more personal than a programmatic conclusion—but some of the things that I've seen that I found very exciting are efforts that increase partnerships. For example, one that I can think of is in an area where I live, the DC Metro area, called Metro Tech. And Metro Tech—financed initially through the Department of Labor grant—is a model in which this organization, Metro Tech, works with employers and brings them resumes. And they ask the employers, what does this person need? What kind of skills, what kind of training will this person need for you to consider them hireable and be ready to hire them?

The employer gets to identify those types of things that the employee needs to boost on their skill set. It costs the employer nothing. The only agreement there is that when the employee completes the course of work and the course of action agreed to, the employee gets the job with the employer. That's one thing that I found interesting.

Certainly web portals to help navigate the maze of training options out there are evolving. They are not—I don't believe they are all that extremely well-focused yet. I think that we are going to see that continue to evolve to help employees understand, to help those who want training to understand which employers are looking for which kind of certification or other training courses.

There is a university collaboration of something that I've seen that is successful in Maryland—applied IT initiatives to bring together 10 higher education institutions in the State of Maryland with the goal of doubling the IT output from the higher education space by 2004, and they're making a lot of progress.

I'd probably be betraying my background—I used to work for Cisco systems prior to this, so I tend to believe the internet can solve a lot of problems. One thing that is very exciting through

NSF funded—and Cameron—with the acronym of ATE, Advanced Technology Education, is Research Triangle Park they're trying to build what you might call the retraining equivalent of a flight simulator. They're trying to provide a retraining tool that not only lets you memorize and learn facts, statistics and other information specific to the technical expertise, but offers a simulation environment can give as close to training and real-world experiences anything on line can. I think we're going to continue to see e-learning environments improve.

Perhaps the last thing—and I've got a lot that I've noticed that has impressed me, but something that is very, very valuable, and I think Mr. Worthington alluded to a similar notion—is the idea of helping students either K-12 or in the training environment get some hands-on activity while learning. Just like with language immersion, the chance to speak while taking the courses helps you more effectively learn and communicate the language for students to be able to get either in the manufacturing space or in the IT space, some internships while they're learning it, will cure some of the new employee problems of not having any real-world experience and is far more likely to help those in a learning environment understand the practical application of what they're learning.

So those are a few of the things that I've seen that I thought were exciting.

Chairman EHLERS. Thank you. Now, Mr. Clark from the other end, the receiving end, I'd appreciate your comments how you see the relationship working between you and the State, between you and the Federal Government and particularly between the Federal Government and the State on many of these issues.

Mr. CLARK. As Mr. Worthington alluded to, I certainly think that the K through 12 is a foundation, building block, for most of the issues that we're talking about now. There is both the technical skill for reading and writing and the ability to communicate. But also a mindset of lifelong learning or a mindset of the ability to be able to change and adapt as things go by.

How you build that into the K through 12 curriculum certainly would have an impact. Not just the technical skill itself, but also the ability to change and adapt to new things and understand that's the way of life certainly would create fertile ground for training in the future on an ongoing basis.

The computer skills I think are essential because almost everything we do in business today has in some way, fashion, or form, a relationship back to a computer system, if not the computer itself. For instance, on the shop floor, the SPC programs that Congressman Barcia had mentioned requires a lot of measurements to be taken, the ability to read those gauges and instruments, to input the data and process to analyze, that sort of thing.

Certainly, there is data collected and analyzed in a lean manufacturing environment when you're trying to improve processes and take cost out. Those kinds of things can be taught at a company level. But if the foundation isn't there for math and analytical skills, then you're starting from a disadvantage.

If you can get those through K through 12 where you can then take the worker from, and tailor his understanding to your specific

company and not have to go back and renew at the basic level, that certainly is the key element.

Chairman EHLERS. Thank you. My time has expired, again. Mr. Barcia, you have more questions?

Mr. BARCIA. Yes. Along those lines, I want to thank Mr. Worthington and Mr. Clark for the—I think the comments were right on target to what I was asking. And if Ms. Ballard and Mr. Mehlman could comment just briefly, because I know we're running out of time here.

UPGRADING THE SKILLS OF INCUMBENT WORKERS

But one of the things that we recovered in your study, Mr. Mehlman, and also we've heard in testimony from the witnesses today, is that many information technology employers do not have the time to allow their workers to attend skills training on company time or perhaps lack the budget for training funds to cover training that in some cases costs thousands of dollars per worker in terms of remedial training that they would need to be proficient and very effective in their capacities.

How do individuals meet these challenges, and do these conditions act as disservatives for people to enter the workforce in jobs or to seek jobs in careers that require these kinds of skills, particularly in the high-tech field? And could these sorts of factors contribute to the shortage of information technology or high-tech workers that Mr. Worthington employs or other companies that are in Bay City also?

How can we utilize those resources from Federal and State levels to work with employers to allow those employees to upgrade their skills? Or, I guess, your comments were ideally, Mr. Clark, to accomplish those things in the K through 12 level. If any of you would like to suggest how we might be able to incorporate that more effectively in the K through 12 system, I think that will be helpful.

Ms. BALLARD. Well, I think the issue of incumbent worker training is very critical because we've already heard the importance of life-long training, even at the K-12 level. If you come out with the most recent skills, then in a matter of a few years you need to upgrade those at any point.

That's why we're very critically interested when we look at a business community talking about needing on-demand training. Just like they provide on-demand manufacturing or delivery, they're looking for the same thing from the educational community which is to be able to deliver those points of skill when they need them. And not necessarily take time out for a whole class or a whole array unless that's needed at that point.

That helps allow them, the individual and the employer both, to participate in training. And it brings that real focus in so that they can see why those skills are needed through the immediate practice.

In terms of the cost, this is a huge issue. We know that the business sector is the primary sponsor of training going on; and that we are smaller players. That's why it's so important from our economic development perspective, the MADC, in terms of the economic development job training grants to be able to allow funding through our educational partners to go directly to employers, so

that they can participate and help offset some of the cost of these trainings.

Mr. MEHLMAN. To your points with respect to why there is often very much of a perceived shortage, I think less than those—less than employees being discouraged by training costs, I think, first, there is extraordinary growth in Michigan and around the country which is a very good thing because information technology is so important to growth, keeping pace with the growth of the challenge.

The other thing is the shortage is often a perceived shortage because employers, what they're looking for, is at this intersection. You think of a diagram of four circles of education, experience, technical expertise and soft skills, and they want specific education requirements; they want specific experience; technical expertise right where they're looking so somebody can start right away; and the soft skills—ability to be part of the team.

If you plot those things out, you end up with this very small little niche at the intersection that employers typically want. They want somebody tomorrow who has all of these qualifications and they can fit in. And it's what both the high growth and demand, as well as the employers' desire for somebody at the intersection, creates a challenge. The training cost dissents are also, at least they have been. This may be changing with the economy. But they have been a bit offset by the fact that these are extraordinarily exciting careers. There has been a huge demand. Stock options were probably more exciting—they certainly were when I started with Cisco Systems more exciting than when I left Cisco Systems—but that is something that has helped keep these companies able to attract and retain a lot of exciting and interesting folks.

As far as some solutions, I do believe web-based training, we're seeing in a lot of the big, best of class companies, is a very viable solution. It is not mainstreamed yet. You have challenges of connectivity, although Governor Engler has been a great leader in Michigan to be a broadband leader. But there will be challenges in getting them to people who perhaps need them the most, certainly, dislocated workers. But as a delivery vehicle the web offers great promise.

Certainly, I believe that more and more firms are going to recognize that successful training is a competitive advantage. It will reward loyalty. We may see after the turmoil of extraordinary growth and workers moving so fast and then so many workers being laid off that workers start prizing those more stable employment places that them give them more training and that they're willing to not seek certain compensation in other regards to get the workforce training.

And then last, it's great that we're here at Saginaw Valley State University because colleges, and universities and community colleges are stepping up significantly. And I think they will continue to play a very important role in the economic development base of the information technology clusters.

Chairman EHLERS. I have one more question or series I want to pursue, and I don't know, Mr. Barcia, how much more you have.

EDUCATIONAL CHOICES AND CAREER OPPORTUNITIES

Ms. Ballard, you highlighted in your testimony that there is little connection between high school choices, high school students, educational choices and potential career possibilities. How should we make a better connection there between educational choices and career opportunities?

And I'm wondering—well, if you—let me rather than anticipate. I think, first of all, as I commented during my opening statement, I always counsel my students to think of their diploma as a learner's permit. It's not the end of your education. It's the beginning. We now learned how to think. We also have to get the concept across in high school.

But also there has to be a connection to the real world. And I remember, years ago, New York City Board of Education wondered what children know about farms, and so they did some tests, what does a cow look like and so forth. And they had elementary school kids draw a picture of a cow. They really did very well. They drew good pictures of cows. They had the equipment in the right place and so forth.

Then they asked how big is a cow? And most of them said about that big. And the reason was that there is a picture of a cow on the carton of milk that they saw every day at the table, and they thought that's what cows are like. It's so important that the Board of Education actually bought a cow and had it go around from one school to another. It frightened the kids half to death.

But I recall the Soviet Union dealing with this years ago. They had factory work groups—and you can do this in a centralized totalitarian state—factory work groups had to adopt an elementary school class with one student assigned to one worker. And so every month or so they would go visit the plant, spend a few hours with the worker and learn something.

And as it got further along in school, they would be taught even more advanced things. I don't even know if they even do that anymore since the Soviet Union disappeared. But what ideas do you have that would work in America or how do you bring this together? How do you relate the kids to the real world and give them some real world experience?

Ms. BALLARD. I think that's why Career Pathways is an exciting phenomenon. And now 90 percent of the school districts in Michigan are participating in it. But as we heard earlier, part of the key component is to bring a work-based learning piece to the classroom training, and the school goal is 100 percent participation.

We have some schools, for example, on the other side of the State down in Berrien County where 100 percent of the students who are in high schools are participating in work-based learning. But that's preceded by the fact that they've had experience and exposure to different career pathways. So they've had an educated choice. They've had the classes that are related to it.

So it's a logical progression for it. And they understand that each of these careers is more a ladder than a stepping off point as you've also alluded to. That if I continue to work, I can move up the ladder or I need to work on the skills. So that's critically important.

The other piece, though, is marketing. We need to be able to give more career information in a customer friendly fashion to everyone in the system. So this is employers—not employers, but parents, students and even educators, so we all understand. Because the nature of work is changing so much, we're creating new occupations daily and people are not aware of that; they're not aware of the opportunities. But they need to know that. They also need to know what are the skills related to that so that maybe they can participate.

Chairman EHLERS. That's precisely why it's important to teach the children how to learn because they're going to change jobs five, six times during their life.

Mr. Worthington, as an employer, does this make sense to you what Ms. Ballard just said? Is that the procedure you would take, too, in trying to improve this?

Mr. WORTHINGTON. Yes. Yes, it does. Some of those are already taking place. We have an annual job fair up in Standish where several of the manufacturers have a booth, and we talk to the people, show them what we're making. We, on occasion, when requested have groups from different schools come in to see the factory and watch the product being made. And it gives them, I think, a good insight as to what it is to be in the manufacturing field. If we didn't have this type of thing, how would they ever know?

And I think the other problem I would mention is that we're in a rural area. And a lot of the young people today in pursuit of the American dream, I like to call it, don't want to stay in a little town. They don't want to be there. They want to go into the big cities where there is a lot more available to them, and that's another problem that we do have. And certainly in a rural areas, the wages are lower than they would be in Detroit and that's another issue.

Chairman EHLERS. That's very true, and I grew up in a very small farming community. It's a great place to grow up and great place to raise kids. Mr. Mehlman, do you have any comment on this?

Mr. MEHLMAN. Yes, sir. A small effort that my office is involved in is called the Get-Tech Partnership where my office, representing the Commerce Department, is working with the National Association of Manufacturers as you mentioned, Mr. Jasinowski, as well as Intel and some other private sector organizations to try to, both through a web portal and through public service announcements, help more students, parents and teachers, especially teachers, understand what careers are available in technology, what the educational prerequisites are, what the careers entail in terms of number of jobs now and a number of projected jobs, likely salaries and other information.

It's not only a web portal, it's something I do. I, about once every six weeks or so, go to a middle school, and meet with students and talk to them about careers in science and technology, which has been a very educational experience for myself as well as hopefully valuable for the students. And Get-Tech really does try through this partnership to try to reach with positive information to reach as many parents, students and teachers as we possibly can.

Chairman EHLERS. Thank you very much. I have no further questions. Mr. Barcia?

Mr. BARCIA. Mr. Chairman, I would just like to say that I appreciated those last comments because the census track data collected in Michigan between 1990 and the year 2000, which is a 10-year period of time, Michigan lost a substantial portion of our 20- to 34-year-old population. And we can be projected to have about 6,000 jobs that would be available for this category of workers that we may not be able to fill because, as it's been alluded to and mentioned, many of the young people in that age group are not only leaving rural communities in their home towns, but actually leaving Michigan to other States where they perceive the opportunities are greater in terms of their career.

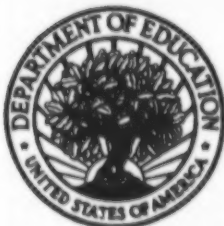
So we appreciate everything that all of you are doing. We need to turn that around and make sure that we retain our future leaders, and business, and industry, and education, and agriculture and all of the great diversity that we have in Michigan. Thank you.

I want to thank each member of the panel today for your expertise, sharing of your expertise and your very, very well delivered testimony of the subcommittee. We will be reviewing that in the future, and it does become part of the permanent record of our Congressional hearings. And I know you all made major sacrifices to be with us this morning and to share that expertise, so thank you.

Chairman EHLERS. And thank you for inviting us, Congressman Barcia, to your district in this fine facility. Before bringing this hearing to a close, I want to thank our panelists. You have been outstanding. You've answered the questions directly and have been very helpful in our effort to gather information. And it gives me a renewed inspiration to try to improve K-12 math, science, technology, and engineering education.

If there is no objection, the record will remain open for additional statements by the Members, and for answers to any follow-up questions the subcommittee may ask of the panel. We may send you some questions by mail and request your response to that. Without objection, so ordered.

And with there being no further business, this hearing is closed.
[Whereupon, at 11:39 a.m., the Subcommittee was adjourned.]



U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)



NOTICE

Reproduction Basis



This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.



This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").